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Improvement in Car Trucks.

The improvement herewith illustrated is the invention of C. R. Morris, master mechanic of the Housatonic Railroad, and H. W. Franklin, superintendent of the same road, and is intended to obviate, so far as can be done by mechanical means, the principal cause of destruction and disaster consequent upon the breaking of a rail during the passage of a train, or the throwing off of the cars from the track by any other cause.

The inventor justly reasons that if the road-bed were perfectly smooth and hard, and lateral motion of a train could be prevented, there could no serious damage result to a train running off the track even at high speed. The sinking of the wheels into the earth, the bumping caused by the opposing ties, and the running down embankments, are the principal causes of the terrible consequences often resulting from accidents of this kind.

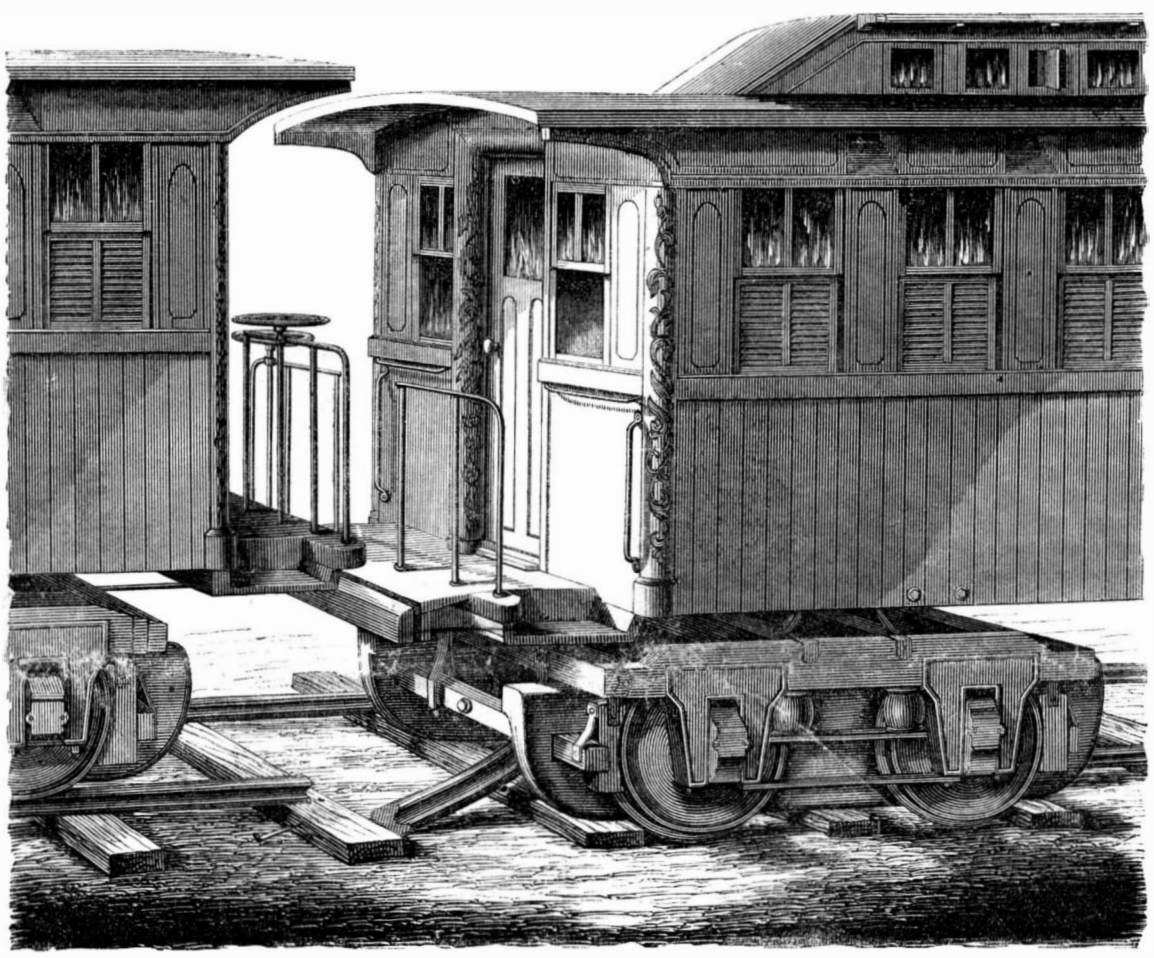
As making the road-bed hard and smooth is of course impracticable, the inventor has attempted to approximate the effect of such a way by attaching to the truck frame two stout runners, made either of heavy plank shod with metal, or entirely of metal, or of any material or combination of materials, which experiment may prove best for the purpose.

These runners are firmly fixed to the truck frame, and descend as nearly as practicable to a level with the face of the car wheels, having clearance, however, for passing over frogs, etc. The brakes act independently of the runners and are in no way connected with them.

It is obvious that, in case of the breaking of a rail in running off the track, these runners will receive at once the weight of the car and prevent all but a slight sinking of the wheels. At the same time they will, in conjunction with the ties, act as brakes to rapidly check the advance of the train, and also prevent lateral motion of the car, as they will more or less indent the ties and thus prevent the cramping of the truck. In case an axle should break while passing over a bridge, the inventors are confident a car would slide entirely across without serious damage, and without any accident to passengers.

An application for a patent on this improvement is now pending through this office.

One of these brakes may be seen in operation at Bridgeport, on the Housatonic Railroad. Address C. R. Morris, M. M., Housatonic Railroad, Bridgeport, Conn.



C. R. MORRIS AND H. W. FRANKLIN'S CAR TRUCK.

STEAM PIPES AND OTHER CAUSES OF FIRES IN MANUFACTURING ESTABLISHMENTS.

Among the most important causes of fires in manufacturing establishments, says the "Bulletin of the National Association of Wool Manufacturers," for July, is danger from steam pipes; the danger being greater because the steam or hot-water pipes being introduced as a measure of precaution against fires, liability from fire is not apprehended from that source. Steam and hot-water pipes are often suffered to remain in contact with wood-work, and frequently packed with charcoal or sawdust to prevent radiation. The following facts illustrate the danger of these practices:

The officers of the insurance companies charged with the examination of mills, remark upon the general prevalence of the impression that there is no danger of ignition from steam pipes. An insurance officer, visiting mills at Exeter, N. H., observed a steam pipe running through a partition, and in contact with the wood-work. The agent, although incredulous of danger, promised to cut out the wood around the pipes. A few days afterwards the wood was removed wherever in contact. In the course of the examination, timbers in contact with the pipe, at a distance of three hundred feet from the boiler, were found to have been on fire. The pieces which were shown to me were completely charred. My informant stated the following case to the agent, who incredulously inquired, "Did you ever know a case where steam pipes set wood on fire?"

"At the Oneco Mills, in Sterling, Conn., there being no steam-heating apparatus, a detached tubular boiler was placed in a building at some distance from the mill, to supply steam for heating and for running a donkey engine to assist the water wheel. A steam pipe two and a half inches in diameter, for conveying the steam to the mill, passed through the wall of the boiler house, then ran perpendicularly to the ground, and under ground into the mill. To prevent condensation of the steam, the pipe was inclosed in a tight box of wood filled with powdered charcoal. All worked well for ten days, when a fire took place in the horizontal inclosing box, near the boiler house—supposed to be from a spark from the boiler—then in the perpendicular portion of the inclosing box, and finally in the part under ground." The facts before stated as to the ignition of charcoal, show that spontaneous ignition was the almost inevitable result of this contact of charcoal with hot-air pipes. Where it is desired to prevent radiation from steam pipes and boilers, it would be well to adopt the plan recommended by Prof. Tyndall in his lectures on "Heat as a Mode of Motion," who observes that "there are cases where sawdust, chaff, or charcoal could not be used with safety (to prevent radiation from steam pipes), on account of their combustible nature. In such cases powdered gypsum may be used with advantage. In the solid crystalline state it is incomparably a worse conductor than silica, and it may be safely inferred that in the powdered state its imperviousness far transcends that of sand, each grain of which is a good conductor. A jacket of gypsum powder around a steam boiler would materially lessen its loss of heat."

Mr. Braidwood, whose vast experience gives great weight to his opinions, earnestly warns against the danger from steam and hot-water pipes. He says: "There appears to be some chemical action between heated iron and timber, by which heat is generated at a much lower temperature than is necessary to ignite timber under ordinary circumstances. No satisfactory explanation of this fact has yet been given, but there is abundant proof that such is the case. In heating by hot-water pipes, those hermetically sealed are by far the most dangerous, as the strength of the pipes to resist the pressure is the only limit of the heat to which the water, and of course the pipes, may be raised. In some cases a plug of metal which fuses at 400°, is put into the pipes, but the heat to which the plug is exposed will depend very much on where it is placed, as however great may be the heat of the exit pipe, the return pipe is comparatively cool. But even where the pipes are left open the heat of the water at the furnace is not necessarily at 212°. It is almost needless to say that 212° is the heat of boiling water under the pressure of one atmosphere only; but if the pipes are carried sixty or seventy feet high, the water in the furnace may be under the pressure of nearer three atmospheres, and therefore the heat will be proportionably increased. Fires from pipes for heating by hot water have been known to take place within twenty-four hours after first heating, and some after ten years of apparent safety."

Mr. Braidwood, in his testimony before a committee of the House of Lords, in 1846, stated that it was his belief that by long exposure to heat, not much exceeding that of boiling water, 212°, timber is brought into such a condition that it will fire without the application of a light. The time during which this process of desiccation goes on, is, he thinks, from eight to ten years. The writer in the *London Quarterly*, before quoted, says that Mercers' Hall, in London, built in 1853, was the victim of its hot-water pipes; the wood-work in the vaulted rooms of the British Museum, containing the Nineveh marbles, was fired in a similar manner, and the new Houses of Parliament have been on fire several times already from a similar cause.

The most cautious insurance companies, taking in view the absolute danger from steam pipes, unless most carefully fitted, and the common belief that there is no danger, which prevents the requisite care, regard the system of heating by steam pipes as ordinarily no safer than heating by anthracite stoves, or by burning wood in a box stove well fitted up—as the visible presence of the fire induces carefulness. Still the system of heating by steam is preferred when the pipes are well fitted, and all contact with combustible matter prevented. It is better that the boiler should be outside in a building erected for the purpose. When the pipes pass through a floor they should be surrounded with an iron plate or flange. The inner rim of the flange should be provided with points touching the pipes, so that a constant current of air should pass through.

The danger in heating by horizontal smoke flues, although they are rarely used in mills except for drying purposes, is greater than in the use of steam pipes. As the whole of the draft must pass through the fire, these flues, if not properly built, are dangerous through their whole course. This is observed in the market green-houses which formerly were generally heated by such flues. The author of "Practical Floriculture and Gardening for Profit," Mr. Peter Henderson, says: "Too great caution cannot be used in keeping wood-work away from the flue and chimney at the furnace end; and for fifteen feet of the hot end of the flue, wood should never be placed nearer than one foot. Do not listen to what your builders may say, as few of them have had experience in such matters; and whatever they may pretend, not one in a dozen knows more about what is dangerous from a fire than you do yourself." After mentioning several instances to show the necessity of the utmost caution in the use of this mode of heating, he remarks that, "Every winter there are hundreds of fires originating in green-houses by the wood-work taking fire from flues."

Although gas, if carefully laid on and properly used, is safer than any other light, it is important that much care should be exercised in the location of the jets. Gas-burners are dangerous when placed near a ceiling. Mr. Braidwood mentions an instance where a gas-light set fire to a ceiling twenty-eight inches and a half from it. The papers, as I am informed, have recently published a statement of a similar instance which occurred at Pittsfield, Mass. Mr. Eyre M. Shaw, superintendent of the London fire department, in 1862, and the successor of Mr. Braidwood, lays down the rule that "jets or movable gas brackets should never be less than thirty-six inches from the ceiling over it. They should be protected on top by hanging shades, and on the sides by stops on the several joints, which should prevent brackets from moving more than a safe distance." "Attention," he says, "should be called to the very common and dangerous practice of nailing tin or iron on adjoining timbers. This has long proved to be no protection, and it has the disadvantage of allowing the timber to be charred completely through before it is known." Fires often proceed from carelessness in lighting gas. Mr. Braid-

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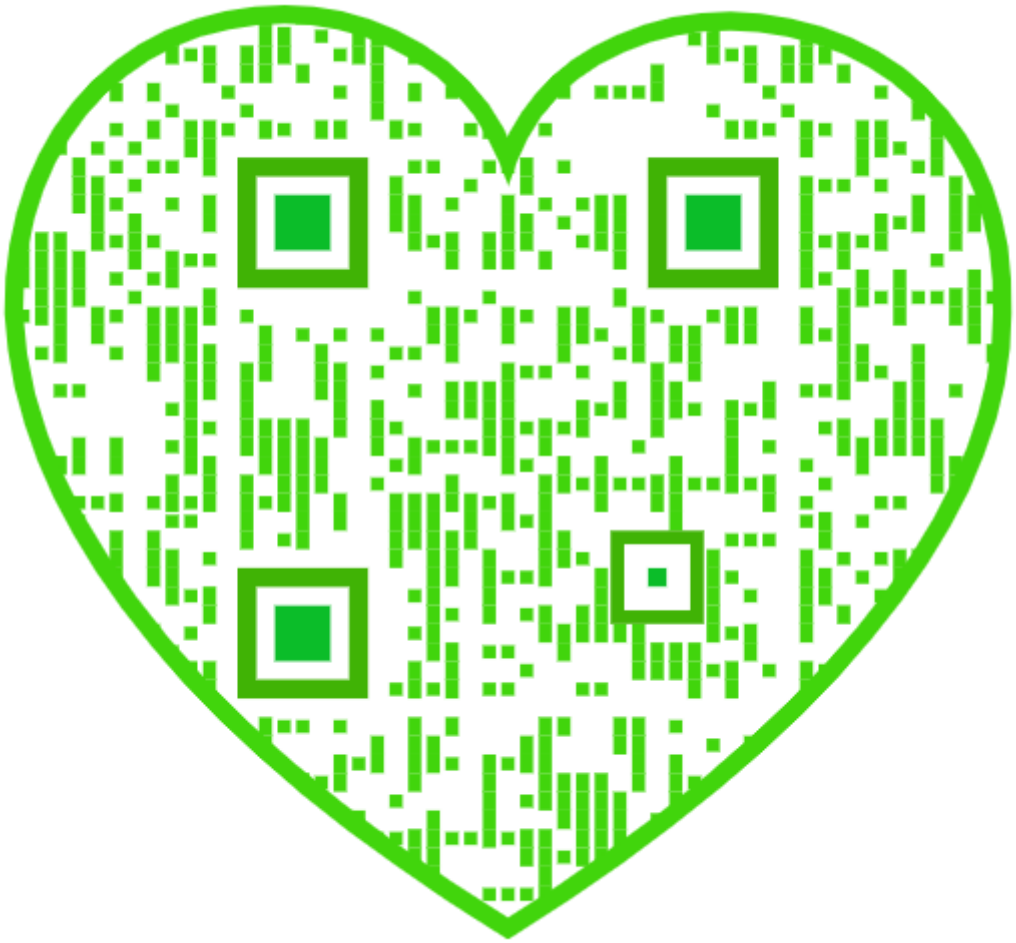

wood relates that, some years ago, upwards of £100,000 were lost through the partner of a large establishment in England lighting gas with a piece of paper, which he threw away, and thus set fire to the premises, although it was a strict rule in the place that gas should only be lighted with tapers, which were provided for that purpose.

It is hardly necessary to dwell upon the more obvious causes of fire common to all structures—such as carelessness in the use of matches, and the dropping of fire from unextinguished tobacco—the latter a constantly occurring source of conflagrations, figuring largely in the causes of fires in London; the ratio of fires for a series of years from this cause, as compared with those from spontaneous combustion, being as 166 to 43. The smoker's match, carelessly thrown away, has become a social nuisance, the great source of general conflagrations now-a-days. One insurance company in London has lately reported that its losses by lucifer matches alone amount to not less than £10,000 annually.

Special notice should be taken of a hitherto unsuspected cause of fires in mills, first noticed by the eminent mill engineer, Mr. James B. Francis, who describes, in a communication to the *Journal of the Franklin Institute*, the circumstances of the ignition of pine timber in the Appleton Cotton Mills, in 1864, through electrical sparks communicated from a rapidly moving leather belt. The belt was driven by a drum eleven feet in diameter, having iron arms and wooden lagging, making ninety-two revolutions, and transmitting a horse-power estimated at one hundred and seventy-five. The pulley driven by the belt was six feet in diameter, and entirely of iron. The peripheries of both drum and pulley were covered with leather. The belt was made of two thicknesses of leather cemented together, and about three eighths of an inch thick. It had been slightly greased on the inside seven or eight weeks before the fire with a mixture of tallow and neat's-foot oil. The part of the belt near the timber was the slack side, running nearly vertically, and at the nearest point was about eight inches from the timber. When it was first observed by Mr. Francis, a constant stream of sparks was passing between the belt and the corner of the timber which had been on fire. The charred timber indicated that about six inches of the corner had been on fire.

The electrical excitement in the mill on the day of the fire had been unusually great, although electrical phenomena, frequently observed in cotton and woolen mills, usually attract but little attention.

Mr. Francis observes that it is not unfrequent to find, on the belt boxes of a mill, an accumulation of flyings of cotton or wool covering every thing not in rapid motion, to a sensible depth. In this case the belt box was very clean, to which fact he attributes the slow progress of the fire, and the detection of its cause. He also remarks "that by the light of the fire at the Appleton Mills, it appears probable that many other fires which were totally inexplicable at the time of their occurrence, may be attributed to this cause."

[From Hours at Home.]

FIRST WEEK OF THE TELEGRAPH.

In the fall of 1850, Mr. Alfred Vail, of Morristown, N. J., gave the writer an account of the receipts of the telegraph at the Washington office during the first four days of its operation, after it had been taken under the patronage of the Government, and, at his request, Mr. Vail afterward wrote it down. That record is now before him, and from it the present statement is made, mostly in the words of the manuscript.

The telegraph was first put in operation, between Washington and Baltimore, in the spring of 1844, and was shown without charge until April 1, 1845. Congress, during the session of 1844-'45, made an appropriation of $8,000 to keep it in operation during the year, placing it, at the same time, under the supervision of the Postmaster General. He, at the close of the session, ordered a tariff of charges of one cent for every four characters made by or through the telegraph, appointing also the operators of the line; Mr. Vail, for the Washington station, and Mr. H. J. Rogers, for Baltimore.

This new order of things commenced on April 1, 1845, and the object was to test the profitableness of the enterprise. The receipts for April 1-4, inclusive, were as follows:

It should be borne in mind that Mr. Polk had just been inaugurated, and, as is always the case on the advent of a new Administration, the city was filled with persons seeking for office. A gentleman of Virginia, who stated that to be his errand to the city, came to the office of the telegraph, on the 1st day of April, and desired to see its operation. The oath of office being fresh in the mind of the operator, and he being determined to fulfill it to the letter, the gentleman was told of the rates of charges, and that he could see its operation by sending his name to Baltimore, and having it sent back, at the rate of four letters or figures for a cent; or he might ask Baltimore regarding the weather, etc. This he refused to do, and coaxed, argued, and threatened. He said there could be no harm in showing him its operation, as that was all he wanted. He was told of the oath just taken by the incumbent, and of his intention to serve it faithfully; and that if it was shown to him by the passage of a communication gratuitously, it would be in violation of his oath of office. He stated he had no change. In reply, he was told that if he would call upon the Postmaster General and obtain his consent that the operation should be shown him gratis, the operator would cheerfully comply to almost any extent. He stated in reply that he knew the Postmaster General, and had considerable influence with some of the officers of the Government, and that he (the operator) had better show it to him at once, intimating that he might be subjected to some peril by refusing. He was told that no regard would be paid to the extent of his influence, etc., be it great or little; that he did not think he was at liberty to use the property of the Government for individual benefit when under oath to exact pay; and cited the rules of the Postoffice in relation to the carriage of letters; but that he was willing to do as directed by the Postmaster General (Hon. Cave Johnson). The discussion lasted almost an hour, when the gentleman left the office in no pleasant mood.

This was the patronage received by the Washington office on the 1st, 2d, and 3d of April. On the 4th, the same gentleman "turned up" again, and repeated some of his former arguments. He was asked if he had seen the Postmaster General, and obtained his consent to his request; to which he replied he had not. After considerable discussion, which was rather amusing than vexatious, he said that he had nothing less than a twenty-dollar bill and one cent, all of which he pulled out of his breeches pocket. He was told that he could have a cent's worth of telegraphing, if that would answer, to which he agreed. After his many maneuvers, and his long agony, the gentleman was finally gratified in the following manner: Washington asked Baltimore, 4, which means, in the list of signals, "What time is it?" Baltimore replied, 1, which meant "1 o'clock." The amount of the operation was one character each way, making two in all, which, at the rate of four for a cent, would amount to half a cent exactly. He laid down his cent, but he was told that half a cent would suffice, if he could produce the change. This he declined to do, and gave the whole cent, after which, being satisfied, he left the office.

Such was the income of the Washington office for the first four days of April, 1845. On the 5th, twelve and a half cents were received. The 6th was the Sabbath. On the 7th, the receipts ran up to sixty cents; on the 8th, to $1·32; on the 9th to $1·04. It is worthy of remark, concludes Mr. Vail, that more business was done by the merchants after the tariff was laid than when the service was gratuitous.

The above details may strike many as very trifling and undignified. So they are, in themselves; but therein consists their charm and their relevancy to the subject in hand. Deep in our nature there is a principle that loves to contrast small beginnings with grand results. History is full of this. Development is characteristic of the works of God, and of the works of man as well. Nothing great ever comes all of a sudden. To the ignorant and unobservant it may seem so, but it only seems, for it is not so. It was not thus with the commonest implement of the peasant—the plow, for instance. Only of late has this—the pioneer and the honored symbol of civilization—risen to its present advanced degree of improvement, for doubtless it has not yet reached perfection. So of every other in the service of man. The telegraph is but a particular instance of a general law—development. To note a single point in its germ-period was all that the writer proposed to do.

As a *finale* to this humble scrap of history, it would seem to be eminently fit to reproduce a relation made by Professor Morse, which will explain itself. It may be proper to add, however, that the date of the midnight passage of the Telegraph bill must have been in May, 1843, as the passage of the dispatch suggested by the lady friend of Mr. Morse was on Monday, May 27, 1844, which, he says, was about a year after the law was passed.

Says Professor Morse: "My bill had indeed passed the House of Representatives, and it was on the calendar of the Senate; but the evening of the last day had commenced, with more than one hundred bills to be considered and passed upon before mine could be reached.

"Wearied out with the anxiety of suspense, I consulted one of my senatorial friends. He thought the chance of reaching it to be so small that he advised me to consider it as lost. In a state of mind, gentlemen, which I must leave you to imagine, I returned to my lodgings to make preparations for returning home the next day. My funds were reduced to a fraction of a dollar. In the morning, as I was about to sit down to breakfast, the servant announced that a young lady desired to see me in the parlor. It was the daughter of my excellent friend and college class-mate, the Commissioner of Patents (Henry L. Ellsworth) She had called, she said, by her father's permission, and in the exuberance of her own joy, to announce to me the passage of my Telegraph bill, at midnight, but a moment before the Senate's adjournment!

"This was the turning point of the telegraph invention in America.

"As an appropriate acknowledgment for the young lady's sympathy and kindness—a sympathy which only a woman can feel and express—I promised that the first dispatch, by the first line of telegraph from Washington to Baltimore, should be indited by her. To which she replied: 'Remember, now, I shall hold you to your word.'

"In about a year from that time, the line was completed, and everything being prepared I apprised my young friend of the fact. A note from her inclosed this dispatch:

'WHAT HATH GOD WROUGHT!'

"These were the first words that passed on the first completed line of electric wires in America. None could have been chosen more in accordance with my own feelings. It baptized the American Telegraph with the name of its author."

NITRO-GLYCERIN.—Sometime since, in alluding to this destructive agent, we urged that its use should be prohibited by law. This subject is now being discussed in Europe; and in Sweden, where the article first made its appearance for blasting purposes, its use has been prohibited, and also in Belgium. The *Scientific Review* calls upon the British Government to follow the same example as a truly humane and praiseworthy act.

ENGLISH IMPROVEMENTS IN SMELTING IRON ORES

An ironmaster of Wolverhampton, England, writes to the *Ironmonger* of improvements now in operation in the Cleveland district, as follows:

"On entering the Cleveland ironmaking district any one from Staffordshire must be struck with surprise that not a flame is to be seen coming from any of the furnaces, except at intervals for a few moments. This is consequent on their way of utilizing the tunnel head gases. They close the throats of their furnaces by means of two castings, a cap and a cone. The cap, which is rested on the brick work of the furnace, has no bottom, but the opening is filled by a cone held in its place by machinery so arranged that when the cap is charged it can be lowered, and so permit the materials so charged to escape into the furnace. The Cleveland ironmasters, most of them, think that a better distribution of materials is insured by this mode of filling, and that it is an easy and inexpensive way of collecting the tunnel head gases. We, however, in Staffordshire, who use the gases, do not agree in thinking a close top at all desirable or attended with a saving of expense in the long run. In the first place, it actually prevents the furnace from being filled by some feet, in order to lower the cone, and also it is impossible to know, without going on to the furnace top and feeling with a rod through a hole made for the purpose how far the furnace is from being full, and as nothing tends to regulate the quantity of iron made more than keeping a furnace filled to one exact hight, this is an objection. The gases, where the top is closed, are usually blown by force of engine, not only through the materials in the furnace, but into and out of the gas pipes, of whatever length, size, or shape may happen to be the firing furnaces, flue, and indeed the chimney tops. The back pressure caused by this is very objectionable. We prefer to exert, by means of a good chimney, such an amount of suction beyond all firing places as to draw the gases, or their products of combustion, from the furnace into the mains, and on through firing places and flues by its very suction, thus rather encouraging the furnace to drive, instead of by back pressure tending to hinder the driving. Another advantage of the open over the close top is that the gas being drawn off is included to mix with the air necessary for combustion, whereas in the other case it comes off at a pressure, and consequently is not so inclined. From being at a pressure it is liable to leakages, and may accumulate, so causing explosions, whereas, wherever it is drawn through a leak, it will, by the same power, be carried on into the chimney, and so rendered harmless. I am pleased to be able to state that one Yorkshire firm work our open-topped system and, in spite of all they hear from Cleveland ironmasters and managers as to the superiority of closed tops, after years of experience in working open ones, having just raised one of their furnaces very considerably, they have again applied our open top system, which they informed me works admirably.

INCREASED HIGHT OF FURNACES.

"The point, however, in which nearly all the Yorkshire furnaces, especially the most improved, differ most widely from ours is in their great hight, also in width of bosh. Six years back furnaces were built in Yorkshire very much as they were in Staffordshire, and at that time their yield of fuel varied from thirty to thirty-six cwt. of coke per tun of iron made. At the present time the hights of furnaces vary from seventy-five to one hundred and five feet, while boshes are of all dimensions, from sixteen to thirty feet. Their yields of coke, too, have varied with the increased hight of furnace and diameter of bosh to an average varying from twenty-eight cwt. down to sixteen cwt., if not lower. These increases to both hight of furnace and width of bosh have taken place so simultaneously, and the temperature of blast has also been so increased during the same time, that it is very difficult to decide to which of the improvements the better yield of coke is chiefly due. I should have felt very doubtful on this point myself, had it not been that Mr. Horton, of Lilleshall, has raised his four cold blast furnaces at the Lodge twenty feet without increasing their size of bosh, and thereby saves seven cwt. of coke to the tun of iron. This hight of furnaces I consider to be the most important question for Staffordshire. Are we using, say five cwt. to the tun more coal than we need, if only our furnaces were raised a few feet; in other words, where about thirty-five cwt. of coal are used might we do with thirty? If so, at a make of 150 tuns of iron per week, and charging the coal as worth 8s. per tun delivered into the furnace, the saving would amount to £780 per year per furnace. If we could get rid of coal or coke, the quality of resulting iron must be improved, as coal or coke is the great sulphur carrier. There are over-careful ones who are not inclined to look favorably, or even hopefully, on any improvement that is likely to necessitate a change in their plant, as it now stands; and others, from opinions formed, I consider errroneously, say, "But our coal or coke is too weak, and would be crushed by the increase of hight of column of measures charged." I answer, it has not proved to be so in Shropshire, nor is the cold blast prevented from entering the furnace, though blown at the same pressure and in the same way as before; namely, about 31 lbs. pressure through the leather bags and open muzzles, usual in cold blast furnaces, into the cold blast furnaces, muzzles not even jointed into tweers. I firmly believe that our furnaces, and coal, or coke, will bear increased hight, provided they are not made much wider. Indeed, I consider that increase of hight does not to any very great extent increase crushing weight, as the materials rest at the bottom on the bosh, which causes those above to carry themselves to a very great extent against the sides. It is well-known that if you fill a tube with very fine materials the downward pressure is not anything like equal on the bottom or any other part of

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them to what would be due to the hight of an unsupported column. This is a thing that ought to be settled by positive experiment, as to every coal in the district, on one experimental furnace. We shall certainly work coals that are not now considered worth trying, just as years back no one would consent to work new mine, or as they then called it, stinking coal, in a furnace. I know, though it was before my time, an instance in which 500 or 1,000 tuns of first-rate new mine coal were offered to be given if it was worked in the furnaces, so as to prove it a furnace coal. It now works to fully as good a yield as thick coal.

HIGH TEMPERATURE OF BLAST.

"Ironmasters in Cleveland, and some other districts also, now use blast of the very highest temperature they can raise, and consider that every increase of heat saves a further very considerable portion of the coal necessary for smelting, besides improving the quality of iron by removing coal, the chief supplier of sulphur. As this heat is raised by the combustion of tunnel head gas, of course it is done at a very trifling cost. My cautious friend, however, will again say 'Yes, but what is the wear and tear on stoves,' particularly when I tell him that in one or two instances I have heard it said it does not do to trust to pyrometers; the best way is to make sure of your blast pipes being red hot. There are, however, several ways of avoiding such fearful wear; namely, by having such a large internal area of stove pipes at work per furnace as shall pass the blast slowly enough to cause it to be heated to the same temperature as the pipes it is passing through. Iron pipes may be safely kept at a dull red heat, as witness a plumber's iron. A better way still is to use Cowper's or Whitwell's fire brick stoves. Where it is wanted to keep the blast at such a temperature as shall easily smelt lead or zinc, one of the best ways of proving its temperature is to drill a half or three quarter hole nearly through the cast iron of muzzle pipes and put a bit of zinc or lead to boil; in trying, pass a bit of wire through the metal to see if it is in a liquid state.

CLOTHING BLAST PIPES.

"Another thing of which the Cleveland ironmasters are very careful, and which we have proved the very great value of, is to clothe every bit of hot blast pipe very carefully with some good non-conductor. The cheapest and best plan of doing this is to take one part of salt, one of whitening, and two of puff of cinder (to make puff of cinder, fill a molder's hand ladle with liquid cinder, and then empty the cinder into cold water; it must be crushed afterwards). To the above four parts, add a good quantity of cow hair and mix up with water to a proper consistency for plastering. For first coat make it so liquid that it can be put on with the whitewash brush, and afterwards lay it on with a trowel as roughly as possible, not more than half an inch thick at a time. After three coats wrap it with iron wire, and you can continue this to any thickness you like.

CALCINING KILNS.

"Another most valuable improvement which they invariably use is that of close-running calcining kilns for burning the ironstone. This is doubly valuable to us in Staffordshire, on account of the cost of our ironstone as compared with theirs. Ironstone raw costs them from 3s. to 5s. 6d. per tun, delivered into their kilns; while the expense of ours is from 17s. to 18s.; kilns also save largely in fuel and labor, one tun of very fine slack being enough to calcine twenty-two of stone, while one man and an engine boy can calcine all the stone required to make 400 tuns per week. The Yorkshire mode of running the cinders on to the top of wagons is also attended with a large saving of labor. No doubt there are other things which escaped my eyes, but these are quite enough to show the rapid strides the northern masters have made and how important it is we should adopt all useful improvements."

The Science Association.

The American Association for the Advancement of Science convened at Salem on August 18th. A large number of the most prominent American scientists, as well as a considerable number of lesser lights, were present. We are unable to give extended space in this issue to the proceedings of this learned body.

The first session was opened by an interesting address from Henry Wheatland, of Salem, Chairman of the Local Committee.

After a response from the Mayor a short business meeting was held. Professor F. W. Putnam was appointed to act as permanent Secretary in the absence of Prof. Lovering. The Secretary read a list of eighty new members, who were unanimously elected. Prof. Agassiz invited the members to visit the Museum of Comparative Zoology at Cambridge. Owing to the excessively limited capacity of the museum, in comparison with the size of the collections, they would have to come in small bodies, but he would do the best he could for them.

Prof. Pierce intimated that the astronomers had some revelations to make on the subject of the recent eclipse. The President replied that a general session would be held some evening in the ensuing week for the purpose of hearing them. The general meeting was then adjourned until ten o'clock to-morrow. The organization of the sections A and B was then effected by the choice of the following officers: Section A, of Mathematics and Physics—Chairman, Prof. Silliman; Secretary, Prof. Henry Wurtz, of New York; Standing Committee, Prof. Barker, of New Haven; Prof. Murray, of New Brunswick, N. J.; Prof. Rogers, of Alfred Center, N. Y. Section B, of the Natural Sciences—Chairman, Prof. Agassiz; Secretary, Prof. T. Sterry Hunt; Standing Committee, Profs. O. C. March, A. C. Hamlin, and E. D. Cope. After the election of these officers, the sections adjourned

In the afternoon the Association was present by invitation at the dedication of the Peabody Academy of Science. The exercises consisted in the formal transfer of the East India Marine Society's Hall and Museum to the Peabody Academy, and five set addresses at the Tabernacle Church. The ceremonies were of necessity somewhat complex and protracted. First, Mr. William C. Endicott, President of the Academy, opened with an account of Mr. Peabody's gift, and the object and aims of the Peabody Academy. Then the Hon. J. H. Clifford, of New Bedford, spoke on the part of Mr. Peabody. His Honor, Mayor Cogswell, spoke for the town of Salem. M. B. H. Silsbee, President of the East India Marine Society, gave a sketch of the history of that notable institution, which was, and is the object of the just pride of Salem.

Mr. Wheatland spoke for the Essex Institute, younger but scarcely less renowned than the Marine Society itself. Finally, Col. Foster had to speak for the scientific men, pilgrims, as it were, at the shrine of Salem and Peabody. The Marine Society dates back to 1799. Membership was restricted from the first to those who had doubled the Cape, either as supercargo, factor, or commander of a vessel. In those days the East India commerce of Salem was the pride of America. In the number of its ships and the value of its trade Salem was far ahead of either Boston or New York. The objects of the Society were to assist by its funds the widows and orphans of deceased members, to improve the art of navigation, and to form a free museum for the instruction and delight of Salem. In all these undertakings the East India Society was singularly successful. Dr. Nathaniel Bowditch, while filling an office in connection with this Society, prepared that dictionary and bible of sea captains known as Bowditch's Practical Navigator, a work which has remained for more than a generation without a rival. The museum treasures up the essence of a thousand voyages, is rich in the romance of the sea and of the past, and has besides a scientific value which can hardly be overestimated. As the commerce of Salem declined, the race of circumnavigators began to die out. Of 348 members of the once-proud Marine Society, only 70 survive Just at the right moment Mr. George Peabody, by a munificent gift, placed the treasures of the Museum in security from all future auctioneers, and gave them even new claims to respect by uniting them with the cabinets of the Essex Institute. It was this union which was cemented and celebrated to-day. The East India Society have parted with their building and collections to the Peabody Academy, which certainly starts with as much capital, both mental and material, as any similar institution in the country.

We will in a future issue notice the subsequent proceedings of the Association.

Heating Cars by Steam.

Practical experiments on a large scale have been made in Germany on this subject especially by the Brunswick Government R. R., the Prussian Eastern R. R., the Hanoverian Government R. R., and the Lower Silesian R. R.

On the Brunswick R. R. the steam was taken from the boiler of the locomotive, passing through a small cock of 1¼ in. interior diameter, into a large pipe of copper about 20 in. in diameter. Two such copper pipes were laid lengthwise below the floor of each passenger car, and connected by hose with the pipes of the adjacent cars. The pipes were covered by a grate along the walking floor. Under the seats they were covered by a wide box of sheet iron, open in front, so as to let the heat into the compartment and to protect the seats from the immediate radiation. These arrangements effected an increase of temperature in the cars of about 25° Fah., which is quite a favorable result.

On the Prussian Eastern R. R. the heating by steam of the passenger and baggage cars of the express trains was introduced in January, 1865. The steam is produced by a small tubular boiler standing in a compartment of the baggage car, and is carried along the train through a 1¼ in. pipe fixed to the lower part of the wagons. The maximum steam pressure is 30 lbs. The pipes are joined by caoutchouc hose between the wagons. The heating of the compartments is effected by hollow cylinders connected below with the above described main pipe. The admission of the steam into the cylinders is regulated by cocks or valves from the outside of the wagons. It has not been found convenient to have this regulation done by the passengers fron the inside of the compartments, and all the arrangements put in at first for this purpose had to be removed. The temperature in the wagons can easily be increased 50° Fah.

The steam pressure is very nearly the same over three wagon lengths, and consequently the heating power of the cylinders is about equal in the first three wagons. The above arrangements would herefore be sufficient for a larger number. No objections or difficulties of any importance have been met with in using this system. The trains are running regularly over a distance of several hundred miles. The consumption of coal is about 1½ lb. per English mile, thus causing but a very small expense.

The Hanoverian Government R. R. runs daily two mail trains, with steam heating, between Cologne and Berlin. The steam is generated in a small tubular boiler put up in a compartment of the baggage car. The heating pipes are laid through the cars lengthwise, their axes being about at the level of the floor. The wagons of one train contain four parallel pipes of wrought iron those of the other train contain but two pipes of sheet iron. Both kinds of pipes have a diameter of 2⅞ in. They are situated at a hight of but one inch between the passenger seats, and located there immediately below the floor, so that a thin sheet of iron with which they are covered is even with the floor level. The emanation of the heat takes place principaly below the seats, where the pipes are uncovered. This emmation can be lessened and regulated by valves so arranged as to cover the pipes more or less. The valves can be worked from the outside of the cars by the employés, as well as from the inside by the passengers. On the first trial of these heating arrangements the temperature of the air was raised from 41° to about 60° Fah. The consumption of coal amounted to 25 lb. per hour, during which time 175 lbs. of water were used. The whole arrangement has been found good and convenient. Further experience will show if it will prove sufficiently effective in severe frost.

The steam heating machinery actually in course of construction on the Lower Silesian railroad, is similar in principle to that of the Hanoverian railroad. The details are not yet known.—*Van Nostrand's Magazine.*

Hartford Steam Boiler Inspection and Insurance Company.

The following report of inspections for the month of July is made by this company:

During the month 337 visits of inspection have been made, 552 boilers examined—471 externally and 202 internally—and 45 tested by hydraulic pressure. The number of defects discovered 173, of which number 28 were especially dangerous. These defects were as follows: Furnaces out of shape, 16—1 dangerous; fractures in all, 118—3 dangerous; burned plates, 26—1 dangerous; blistered plates, 34—1 dangerous; cases of incrustation and scale, 43—4 dangerous; cases of external corrosion, 35—3 dangerous; cases of internal grooving, 8; water gages out of order, 7; blow-out apparatus out of order, 5—3 dangerous; boilers without blow-out apparatus, 5; safety valves overloaded, 12—3 dangerous; safety valves inoperative, 3—all dangerous; pressure gages out of order, 40—4 dangerous; boilers without gages, 2; boilers with broken stays, 2; cases of deficiency of water, 2—both dangerous.

In one of the cases reported, the fracture was so great and the water escaping so freely, that it was with difficulty the water in the boiler could be kept at the proper level, with the pump constantly running.

In the case of blistered plate, reported dangerous, after the blister had been trimmed off the plate was left so thin that the inspector's hammer easily went through it.

Of the cases of scale in boilers, several were found to be from one fourth to one half an inch in thickness.

In the dangerous cases of corrosion, the plates were found so badly eaten into that the inspector's hammer penetrated them.

Of the three dangerous cases of inoperative safety valves, two were reported by the inspector as having the loads placed at proper points, but it was found that, in addition to these the "trap doors" in the floor above were bearing on the top of the weights. In the other case the inspector found a heavy timber resting on the lever, which had fallen there quite unknown to the engineer.

The importance of trying the hight of water in boilers before firing up should be thoroughly impressed upon watchmen. It was forcibly illustrated at one of our agencies during the month, as following: An appointment was made to inspect a new cylinder boiler used in a stove foundery, at 6 A.M. When the inspector reached the boiler room he found a brisk fire under the boiler, which had but about two inches of water in it. Happily the watchman had left the furnace doors open, so that the boiler was not red hot. Upon inquiry it was found that the proprietor had blown off the boiler the previous evening, but had forgotten to notify the watchman not to fire up as usual. The man-hole plate had been left in the boiler, and the watchman, seeing no indications to the contrary, supposed all was right.

Comparison of the Covering Powers of White Paints.

The following is a test now adopted by many dealers for testing the covering powers of white pigments: "Fine, buff Manilla wrapping-paper, stretched on frames of wood, is painted with best coach black, and varnished until the surface presents a glassy smoothness. To cover and conceal this shining black surface, and present a *white* surface, is the object of the test; the utmost care being taken all through to note the exact number of grains, by weight, of material used in each and every coat. No turpentine is used in the painting, the paints being thinned with linseed oil to a proper consistency for spreading evenly under the brush. The first coat is applied to the whole surface of the paper; the second to a fraction more than three fourths of the sheet, a portion being left in every case, whereby to compare the effects produced by the successive coats.

"It will be understood that a separate sheet is used for each brand. Size about two and one eighth square feet."

BLACKBERRY WINE.—Measure your berries and bruise them; to every gallon add one quart of boiling water; let the mixture stand 24 hours, stirring occasionally; then strain off the liquor into a cask; to every gallon add two pounds of sugar; cork tight, and let it stand until the following October, and you will have wine ready for use without further labor, that every family will highly appreciate and never do without afterward if they can help it.

FARMERS AND MECHANICS' INSTITUTE, EASTON, PA.—The Eleventh Annual Fair of this Association will be held at Easton, Pa., commencing Tuesday, Sept. 14, 1869, and ending Friday the 17th. A large number of premiums are offered. Entries should be made before 5 o'clock on the 13th. The entry books will be opened on Monday, Sept. 6th, at the office of the Secretary, James M. Porter, Esq., in Easton who may be addressed by parties interested.

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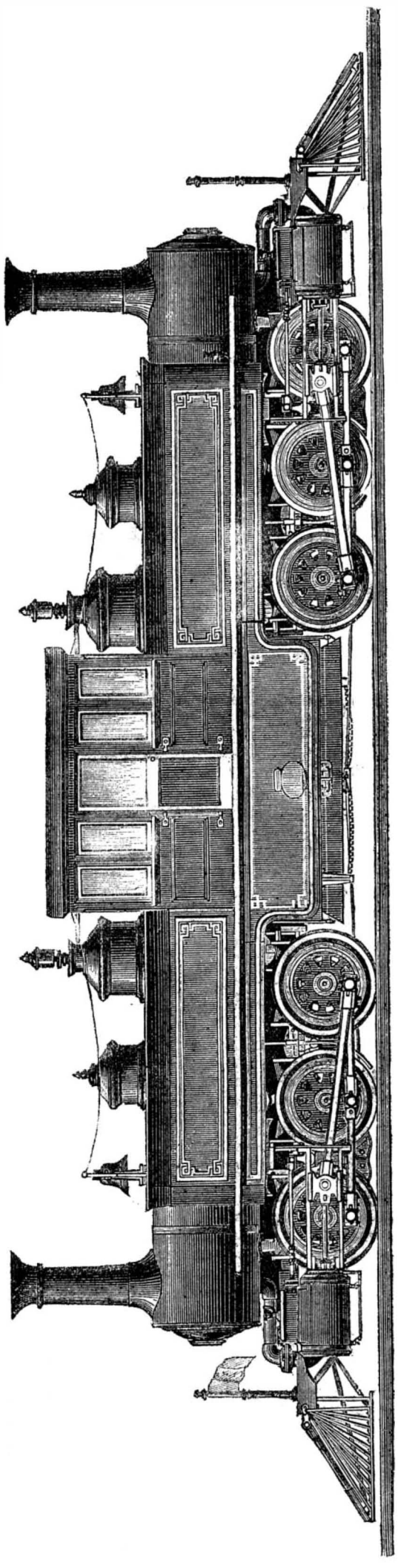
Improved Locomotive for the Pacific Railroad.

Our engraving is an example of the Leggotype process, a photographic method of reproducing engravings of all kinds, the invention of W. A. Leggo, of Montreal, Canada. The process is now extensively practiced at Montreal by Leggo & Co., where they have a large establishment. We have examined many excellent specimens of their reproductions.

The double locomotive, of which we here give an illustration, was designed by Robert F. Fairlie, and constructed for the Central Pacific Railroad by Messrs. William Mason & Co., of Taunton, Mass. Of this engine, which is intended to be employed on the Sierra Nevada inclines on the western side of the summit, we herewith publish a side elevation. The engine is carried on six pairs of 3 feet 6in. wheels, disposed in two groups as shown, each group being driven by a pair



DOUBLE-BOGIE LOCOMOTIVE FOR THE CENTRAL PACIFIC RAILROAD.

of 15-in. cylinders with 24-in. stroke. The tractive power will thus amount to 257·14 lbs. for each pound of effective pressure per square inch on the pistons, or with a mean effective cylinder pressure of 100 lbs. per square inch, the engine will exert a pull of 25,714 lbs., or very nearly 11½ tuns. The weight of the engine in working order is 54 tuns, or about 4½ tun per wheel, and as the whole of this weight is available for adhesion, we have no doubt that the great tractive power of the engine will be fully utilized.

The engine has about 1,650 feet of tube surface, 125 feet of fire-box surface, and a fire-grate area of about 25 square feet, so that it will no doubt have ample steaming power. The water is carried in a pair of wing tanks, holding collectively 3,000 gallons; and coal bunkers are provided capable of carrying 2½ tuns of coal. Altogether, we believe that the engine of which we have above given particulars will be found well designed for the work it will be called upon to perform, and we anticipate that it will prove to be the forerunner of a number of locomotives of a similar type. Mr. Fairlie's system of locomotive construction is pre-eminently adapted for use on such a line as the Pacific Railroad, and indeed for American lines generally, and from the favor with which his plans are already being regarded by some of the leading railroad engineers in the United States, we believe that the practical results obtained with the engine we illustrate will be watched with great interest.

Velocity of Projectiles.

At the conclusion of the President's address, delivered before the Institution of Mechanical Engineers, at Newcastle, England, on the evening of August 3d, Captain Noble's apparatus for determining the velocity of projectiles in various parts of the bore of a gun was exhibited in the library of the Literary and Philosophical Society. The instrument was explained and various experiments were conducted by Captain Noble, in the presence of most of the auditory who had been present at the delivery of the address.

The object of the instrument, which was called a chronoscope, was stated to be the measurement of very minute portions of time, and it had been specially constructed with reference to artillery purposes. In describing the means that had been adopted for obtaining and retaining a uniform motion, Capt. Noble pointed out that the instrument consisted of half a dozen disks placed on an axle, these disks being put in motion by means of a heavy weight, and their relative velocity being regulated by a train of toothed wheels.

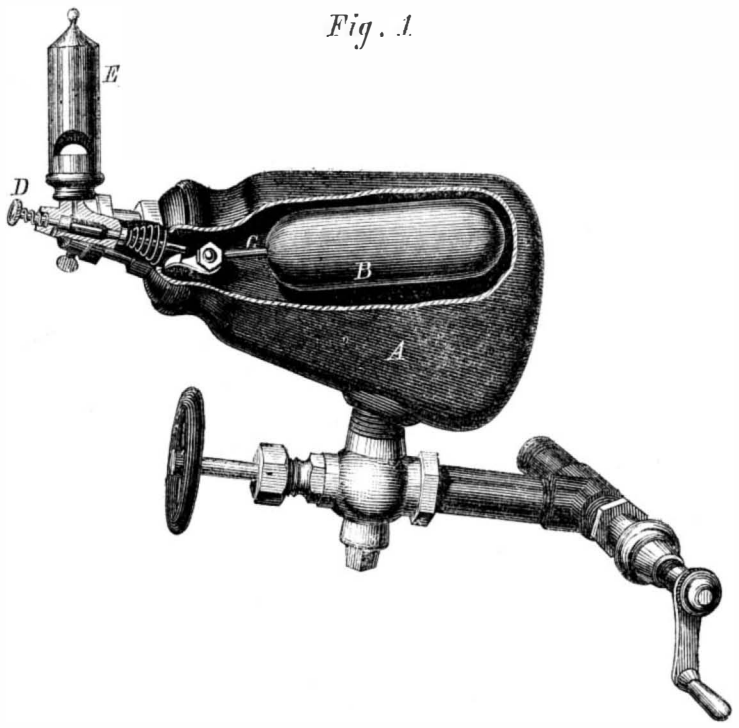
A uniform and very rapid rotation was thus imparted to the disks; each of which bore a certain ratio to the one preceding it. Knowing the speed of one, therefore, they would readily calculate the rate of revolution of the most rapidly revolving disk; and by a special clock-work arrangement the precise speed, to hundredths of a second, could be indicated at any moment. Supposing the first toothed wheel to describe five revolutions within a second, the last of the series would revolve 750 times—the same space of time—such was the ratio of one disk to the other. The weight was so arranged that any required speed could be obtained. The speed was generally—taking the velocity at the circumference—from 1,000 to 1,200 inches per second. If it were exactly 1,000 inches per second, an inch of rotation at the circumference of the wheel would represent the thousandth part of a second; and so by an arrangment attached to the instrument, they were able to read to the thousandth part of a second; the time actually capable of being measured, so far as the rotation of the wheel was concerned, was the millionth part of a second. From experiments recently made at Woolwich to determine the speed, it was found that 750 revolutions were made in 24·4 seconds, second and third experiments giving 24·2 and 23·9 seconds respectively. Another series of experiments gave the 750 revolutions in 23·4, 23·5, and 23·4 seconds, and on a third occasion 23·3, 23·4, and 23·5 seconds. The instrument was, therefore, almost absolutely accurate. Capt. Noble next showed the mode of registration, which was effected by means of an induction coil. In measuring the velocity of a projectile, the primary wire of the coil was attached to any point of the barrel of the gun, or a set of wires might be so attached at intervals along the barrel, and at theinstant of the passing of the shot, the wire or wires would be cut by the projectile, and an impression would be left upon the disk, which was covered with prepared paper for receiving the spark. Each of the disks might be attached to some portion of the gun barrel by a separate coil, and the precise moment of time at which the shot passed the identical spot would be most accurately recorded upon the disk. An experiment was performed very successfully with the view of more clearly showing how exactly and perfectly the apparatus performed its object; the gun being fired, the six sparks were instantly perceptible, and the velocity of the projectile, through as many portions of the bore, was indicated. Capt. Noble then showed how this valuable instrument was intended to be applied to a useful purpose, and he referred to expriments now going on at Woolwich to test the respective powers of slow and fast burning powder. The results, so far had shown that the time taken by the slow burning powder to project a shot a certain space was five times that of fas-burning powder; that the velocity of the two, at the muzzle of the gun, was about equal, and that the pressure of the fast-burning powder acting on the gun was about double that of slow-burning powder.

ELECTROTYPE plates for prining were made at the same time, without mutual knowledge or concert, by Professor Jacobi, of St. Petersburgh, and J. C. Jordan, of England, in 1839.

Patent Safety Apparatus for Steam Boilers.

Steam power is now so generally used that any thing constructed for the purpose of promoting safety must be regarded with much interest by almost every one. It is doubtless the case that many of the accidents occurring to steam boilers are the result of a lack of water at some time, and which might be prevented if a reliable alarm were in use

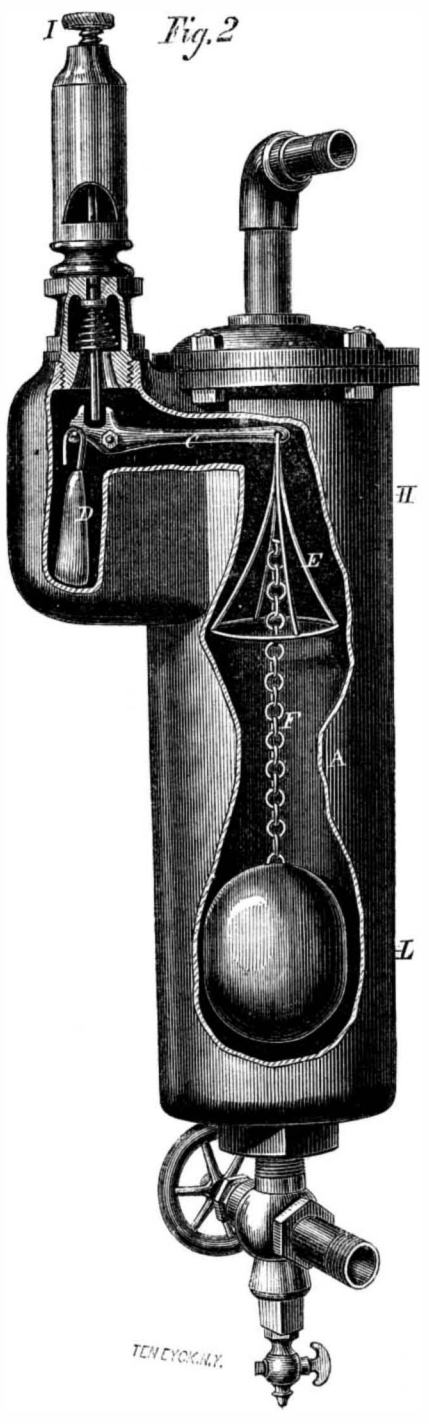
Fig. 1



THE LYNDE SAFETY APPARATUS FOR STEAM BOILERS.

The engravings presented herewith illustrate safety appliances, by the use of which, it would seem, much of accident and repair might be avoided.

Fig. 2



Figs. 1, 2, and 3, represent a water alarm, the novelty of which consists in the construction and operation of the valve, and also that they are self-detectors, as it seems impossible that they can get out of order without at once showing it—a fundamental requisite for safety in use. The valves and springs shown are similar in all, the levers which move them being operated by floats under different arrangements.

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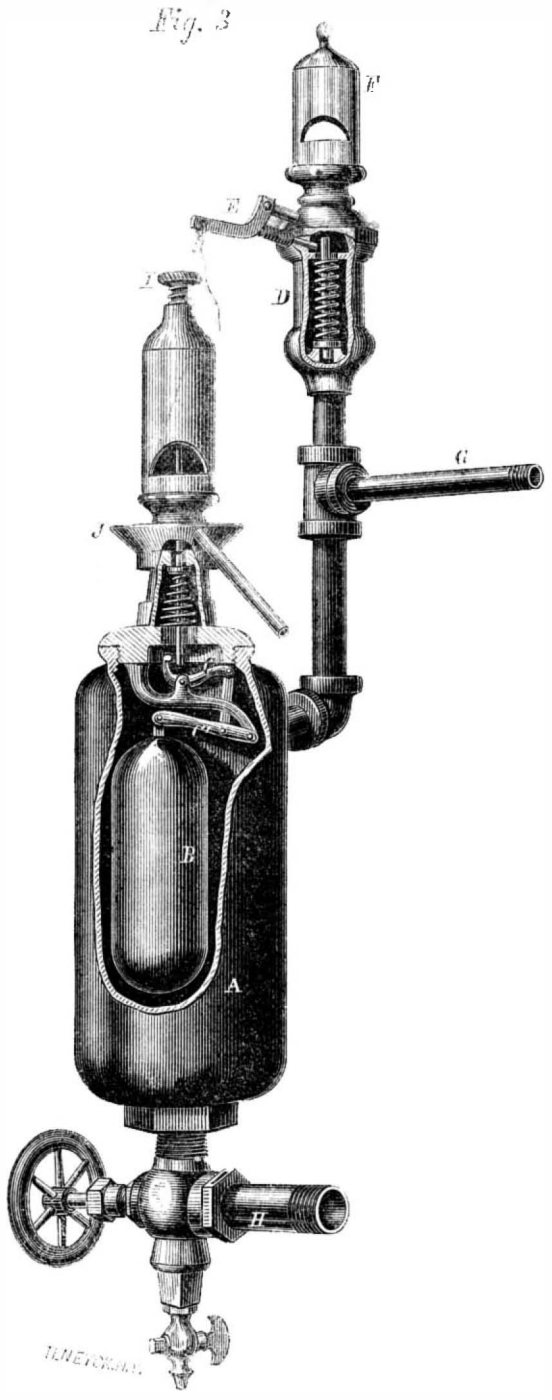
Fig. 1 is simply a low-water alarm. A is a cast-iron case about eight inches long and six inches wide at the large end, and has a clear space or chamber inside three inches wide. B is a copper float five inches long and two inches diameter (coated inside and out with a non-corrosive metal), which hangs loosely on a pin, by lever, C. The valve is seen held to its seat by the conical spiral spring. D is the knob on which pressure is applied to test the valve.

OPERATION.—Being attached to the boiler by a single pipe, while the water in the boiler is above said pipe, the case is full, but if the water in the boiler falls below the pipe the water in the case falls out, the float drops, the lever, C, strikes the valve stem, tipping the valve on its seat, and steam rushes through and sounds the whistle, E. Start the pump or injector, and as the water rises by the pipe, the case fills, and the instrument is quiet again, ready to repeat the operation; no expense is incurred and no attention required. This is shown connected to a T, in which is also one of the gage cocks, which is found to be a favorite way to attach them, as it is then unnecessary to bore the boiler—simply using a nipple and T in the same hole where the gage formerly was.

Fig. 2 shows an alarm both for low and high water, and is connected to the boiler by a steam and water pipe; thus the water in the instrument will be on the same level as that in the boiler. A is a cast-iron cylindrical case sixteen inches long and four inches in diameter. B is a copper float—three and a half inches diameter, constructed as in Fig. 1—suspended from the lever, C, by the wire frame, E, and chain, F. D is a weight which keeps the lever, C, in a horizontal position when not being acted on by the float. The chain is constructed of German-silver wire and of round links, so it can neither corrode readily nor kink. The valve and spring are seen the same as in Fig. 1. H is the high-water, and L the low-water alarm line. When the water falls the float pulls down the lever, C, tipping the valve; and when it rises too high the float strikes the frame, E, the lever is pushed up, and the valve is tipped the other way, causing an alarm in either case. By pressing on the knob, I, the whistle is sounded at pleasure.

Fig. 3 represents alarms for low water and high steam—or either alarm may be used separately—the whistles being separate and having different sounds, so as to avoid confusion. A is a cylindrical case of iron or brass, about eight inches

Fig. 3



long and three inches diameter, in which is supended a float, B—the same as B, Fig. 1—by compound levers, C and C'. The same construction of valve and spring as in Figs. 1 and 2 will be noticed; D is a small spring safety valve—the valve is the same as in the water alarm, but is on the top of the seat instead of the under side. E is a lever and pin for trying the valve. J is a cup and pipe to carry off any drip from the valve; G is the steam connection, and H the water connection to the boiler. This instrument may be attached so that the water in it will be on the same level as in the boiler, or so that the alarm line for low water will be at the point of connection as in Fig. 1. The operation is similar to the others, and will be readily understood without further description. The high steam alarm simply sounds the whistle as the pressure becomes strong enough to raise the valve which is set by a screw to the required pressure.

Fig. 4

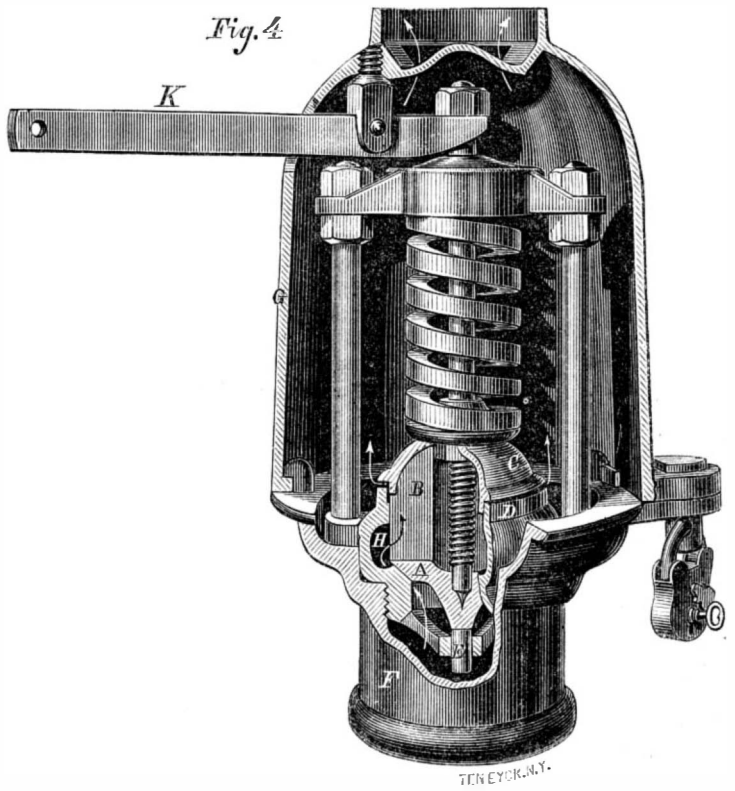
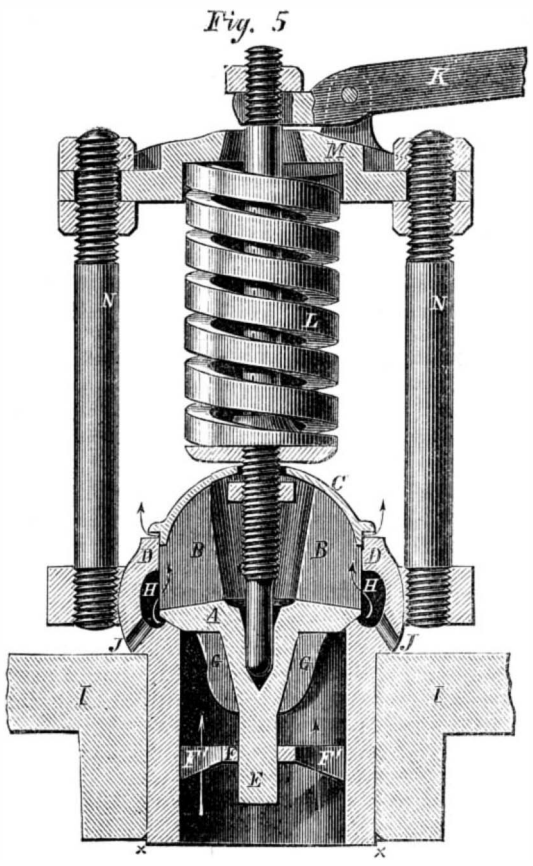


Fig. 4 shows a locked safety valve, the novelty in which consists in the construction of the valve and seat. In Fig. 5 the same valve is shown constructed so as to be applied to the dome cap of a locomotive, of which I is a section. As Fig. 5 shows a vertical section of the valve it can be better described by it, and the operation is the same in both. A is the valve; B, guide wings on top of the valve and connecting the concave disk, C, thereto. D is the rim, against which the guide wings bear. E is the guide pin to the valve. F is the guide nut. F' is the guide nut braces. G the wings to strengthen the guide pin, E. H is the annular passage for steam around the valve, by which the steam is turned up against the disk, C. K is a lever of any suitable length for trying the valve. The valve is held down by the spiral spring, L, and set as required by the crosshead, M, and bolts and nuts, N N. The result being a safety valve that will rapidly discharge the surplus steam and cause no waste by blowing the pressure lower than when the valve commences to alarm.

Fig. 5



OPERATION.—When the valve, A, begins to rise, the steam will pass through the narrow space (about one sixty-fourth of an inch) between the disk, C, and rim, D. If the pressure then rises, say a couple of pounds higher, the valve opens wider—while the space between the rim and disk has not increased, the sides being vertical—and more steam will pass into the passage, H, than can pass by the disk, C; then the whole force and velocity of the escaping steam will be exerted on the disk carrying it suddenly upward, with the valve, overcoming the increased power of the spring, and permitting the steam to blow off rapidly until the pressure has fallen to near where the valve started to alarm, when it will suddenly close, thus simply blowing off the surplus steam. Fig. 4 shows the valve as it is locked in a case (the whole hight of the holder and cover being about eleven inches and a half, and about six inches diameter). It cannot be tampered with without violating some of the parts, thus apparently preventing, as far as can be done by machinery, an over-pressure of steam.

The water alarm was patented Feb. 11, 1868, and the safety valve May 18, 1869, by J. D. Lynde, 405 North 8th street, Philadelphia, where he can be addressed for further information.

Hammering Iron until it is Red Hot.

In his lectures on "Heat," delivered recently at the London Institution, Mr. G. F. Rodwell alluded to a singular case of motion transformed into heat; namely, the rendering of iron red-hot by repeated strokes of the hammer. If Mr. Rodwell, who is so well versed in the history of science, will turn once more to the works of Robert Boyle, he will see that this "father of chemistry" had notions of the transformation of mechanical movement into heat very nearly akin to, if not quite identical with, those professed at the present day. Robert Boyle alludes to the rapid development of heat in an iron nail by repeated blows of the hammer *after it has ceased to travel* into the wood. It has been asked whether iron could be hammered cold until it became red-hot. Mr. Rodwell informs us that it can. Having requested a blacksmith to try the experiment, a piece of very tough iron was hammered with a moderately heavy hammer; it became hot, but would not scorch a piece of paper. It was then hammered by two men, one of whom used a sledge hammer, but with no better result. Presently a man, who was working in the shop, said he had often lit his forge fire by this means before matches were plentiful. He took a nail such as is used for horseshoes, and, after hammering for less than two minutes with a light hammer, part of the nail was brought to a bright red heat. The blows were light but frequent, and the nail was partly turned at each blow.

MONSTROSITIES AMONG TROUT.

BY A. COOLIDGE, M.D

The egg of a fish consists of an enveloping membrane containing the yolk or vitellus. The first step in the development of the egg is the formation of innumerable cells on the surface of the vitellus, which are closely packed together, and form a new membrane or layer surrounding the vitellus. The next sign of organization is the thickening and condensation of one spot of this new layer. The thickened part has an elongated oval shape, and in its center, running longitudinally, is a delicate line or furrow.

This is the first beginning of the fish. The backbone of the fish is formed around this furrow. The anterior extremity spreads to become the cavity of the brain, and the tail grows from the posterior end. The yolk remains inclosed in the new layer as in a sac; as the fish grows this sac becomes constricted, so that the upper part of it is taken up into the body of the fish, while the lower part remains hanging out, and is called the umbilical vesicle, and it is in this condition that the fish is hatched. He is attached to the upper part of the umbilical vesicle, which, being too heavy for him to move, he remains anchored by it, as it were, at the bottom of the stream, wriggling only his head and tail. The fish is fed by the absorption of the contents of the vesicle which decreases every day as he grows larger. After some days he is large enough to swim about with the vesicle under him, and, at the end of forty to fifty days, the sac is no longer to be seen, and the fish swims freely about.

All fish, however, are not perfect, and oftentimes deformed ones are met with. Sometimes, instead of there being one fish only attached to an umbilical vesicle, there are two; not two separate ones, but two heads attached to one body, or two bodies attached to one tail, as shown in Figs. 1 and 2. This curious partial duplication of the fish takes place in the egg long before it is hatched, and is due, probably, to a bifurcation of the furrow around which the backbone of the fish is formed. The cells of the thickened oval spot, instead of forming one straight furrow, for some reason or other, form one in the shape of a Y. Two backbones form around the two branches, with two heads, while one tail has to do for both.

As far as has been observed, it is always the anterior part which is duplicated. No one body with two tails has been found. The tail remains single while the head and body are doubled; and this duplication varies from a partial division of the head only to two nearly complete fish, with different brains, and hearts, and stomachs, and whose hearts do not even beat together, though the circulation in the tail must be common to both. On the other hand the head alone may show signs of duplication. One young fish was found in whom this had extended only to the partial division of the

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head. Of the four eyes, the two middle ones were not completely separated; they looked something like a figure of 8 on its side. Generally, one of the half fish is larger and stronger than the other, as seen in Fig. 2, and carries the smaller one off wherever it will,notwithstanding the apparent effort of the smaller one to go somewhere else.

These double fish are not very common, and as they die after the vitelline sac has been absorbed they are not seen by fishermen. The ratio of these deformed fish to the number of eggs in the hatching troughs was roughly estimated at twenty to twenty thousand, or one in a thousand eggs.

But a curious fact proved that the eggs of some fish contained a larger proportion. One large blind trout had a small pond to herself, and was fed daily by food presented to her on the end of a stick. Her eggs were kept apart,and out of about two thousand there were sixteen deformed fish, or one to one hundred and twenty-five eggs. Certain fish would seem to be more predisposed to produce eggs creating these monstrosities, and were we to ask for the cause of this,we should probably have to look for it in some anomaly of the ovary of the fish which produces the eggs.

A deformity more common than the double fish, is an apparent curvature of the spine. The fish, instead of being straight, with the umbilical vesicle under him, is curved round so that its tail turns under, and sometimes touches the under surface of the sac he is attached to. Fig. 3 represents one of these semi-circular fish. They are obliged to swim on their side, and move round and round in a circle, or in a spiral, without being able to go straight.

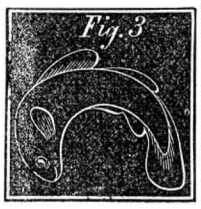
Fig. 3

These deformities are mentioned and treated by Buckland in his "Fish Hatching." He there suggests that humpbacked deformity may have been caused by pressure during their "transport in the egg state." In the instances mentioned above, however, there was no transportation, the ova being taken from the fish on the spot.

Out of two thousand salmon ova hatched at Messrs. Dexter & Co.'s fish farm, there were no deformities, but in another lot of about the same number there were two double-headed specimens just hatched out.—*American Naturalist.*

RESTORATION OF PERSONS APPARENTLY DEAD FROM DROWNING.

THE PHILOSOPHY OF THE TREATMENT.

As we promised, we herewith give the philosophy of the method prescribed by Dr. Benjamin Howard, published in our last issue:

Death from drowning is caused not because of the presence of water, as such, but because of the absence of fresh air from the chest.

Whether excluded by water, as in drowning; by a cord closing the windpipe, as in hanging; by dense smoke, as in a burning building; by foul gas, as in an old well, or from escape of ordinary burning gas into a close room; whether by burying the face in a soft pillow, or by a piece of tough meat lodged in the throat, corking up the entrance to the windpipe —in all these cases the immediate cause of death is one and the same.

The breath is the life. Let it be shut out from the chest, or anything else be entirely substituted for it, and *suffocation* at once begins, and this continued always ends in *death.*

To avert death, then, and re-awaken life in all these cases, you must not begin by giving a little stimulus, or "something reviving," as it is called; not by applying hot blankets, or putting the patient into a nice warm bed. The first and instant necessity is, if possible, to give breath until the patient is sufficiently recovered to be able to take breath for himself. This alone can start life again, and maintain it in action. If the draft and door of a stove is long kept tightly closed, the fire dies away to an interior spark. If in this condition you begin to put in more coal, your disturbance is very likely to completely extinguish the remaining spark.

To apply heat in any form to the outside around the stove would be simply absurd and ridiculous. If, on the contrary, you should open the draft,rake away the ashes and dead coals from the mouth of the draft up to the interior spark, open the damper and set a current of air in motion through the stove, or, in a great emergency, add a few gentle steady puffs from the bellows, you would be adopting what all experience proves to be the most sensible and only successful way to rekindle your fire to brightness and warmth.

The relation of fresh air to the burning of a fire is precisely what it is to the reviving and continuance of life. Therefore, if the friction, the breeze, and the slap upon the nerves over the stomach, as directed in Rule 1, fail to startle and revive the patient, then it is necessary to see at once that the track from the mouth to the chest is clear, so that the passage of air to the chest be not obstructed.

By following the directions of Rule 2, fluids accumulated in the stomach, chest, or throat, are removed. The stomach, at a greater elevation than any other part of the track, is pressed between the roll of clothing and the spine, whence water or other accumulations have a complete drainage down to and out of the mouth, which is the lowest point.

The next step is to induce air to enter the chest by what is called artificial breathing or respiration. Rule 3 prevents the tongue tumbling back into the throat, to choke it up as by a piece of dead meat, and provides for its tip being kept out and to one side of the mouth. Also by keeping the arms well stretched back, helps to keep the chest somewhat expanded.

The actual breathing is effected by the directions in Rule 4. In order to understand this, it must be remembered that the chest containing the elastic lungs is an open-work, ribbed, bony box, which above the bottom of the breast bone is scarcely movable, except by one's own will, the ribs being fastened both in front to the breast bone and behind to the spine. The ribs below the breast bone—known as the short ribs—are fastened only behind to the spine; they are very elastic and loose, and thus are called the floating ribs.

It is this enables any foolish woman to diminish the size of her waist to any standard fashion may demand.

All the breathing necessary to life can be performed by this part of the chest alone, as is generally the case during sleep.

When the pressure is made upon this part of the chest, then, as directed in Rule 4, the cavity of the chest is greatly diminished; what air is in it is partially forced out; and on suddenly letting go, the natural elasticity of these semi-cartilaginous ribs compels them to spring back to their natural position. This would create a vacuum, but that the fresh air is thus compelled to rush in through the mouth to occupy the otherwise vacant space.

This action, repeated as directed, compels successive volumes of fresh air to enter the chest just as occurs in natural breathing, and so it is called and constitutes "artificial breathing" or "artificial respiration."

The first returning natural gasps are apt to be irregular, and if the artificial breathing be continued regardless of them, the motions of the operator may actually interfere with and interrupt them: therefore, as directed in Rule 5, let your motions be so timed to the natural effort of the patient as simply to aid and deepen his breathing, which is as yet imperfect and insufficient.

With life comes heat, but the latter may be greatly favored by following the direction in Rule 6. Warmth, rest, and fresh air are now to be regarded as the important means of completing the resuscitation already begun.

These rules, except Rule 2, are equally applicable in apparent death from suffocation from any cause whatever, whether from hanging, chloroform,foul gases, or in still-birth. In the latter case, the lungs never having been expanded, it is better to combine forcible inflation by the mouth alternately with the forcible expiration by pressure.

To practice forcible inflation, the mouth being well cleared of mucus, close the nostrils with one hand while with the other you open the mouth widely by pressing upon the lower front teeth.

The larynx, known as "Adam's Apple," is gently pressed upon so as to prevent air passing behind it into the stomach; and then, having taken a very full breath, fit your lips to those of the patient, and blow with a steady force, nearly emptying your lungs at one effort; then compress as directed in regular alternation.

In death from either of the above-mentioned causes, the machinery of the human system is in no part damaged or broken; the engine has only ceased moving, the fires of life being put out.

It is this which allows a hope of resuscitation we cannot cherish in death from other causes. In some of these cases, so long does the vital spark linger after all signs of life have ceased, that recoveries are recorded from a few minutes to two or three hours after the patient, but for artificial respiration, would have been abandoned for burial. Since a few familiar lectures on the subject of resuscitation were given to some of the policemen of New York, the resuscitation of drowned persons by them has been frequently reported.

By an hour's practice upon a friend, any reader may acquire as much skill for such emergencies as a physician need possess, and at this small cost may perhaps obtain the life-long satisfaction of having restored one or more valuable lives otherwise irrecoverably lost.

How to Make Asphalt Walks.

Supposing that the walks are cut out, the bottoms filled up with rough ashes or other material to within about three inches of the desired level, rolled firm, and the edges of stone or box laid, commence to prepare the asphalt as follows: A clean space having been made near the large heap of sifted ashes, two men set to with shovels, by taking about two barrowfuls from the heap and spreading it in a circle, about three or four inches deep, a little to one side. The tar is then lifted out of the tubs with a long-handled ladle, and poured over the ashes until they have got just sufficient to soak them without any going to waste by draining away. Then, much in the same way as a mason's laborer mixes mortar, the ashes are turned quickly over once or twice, the better to soak them, and again laid a little to one side as the foundation of the heap. Another similar quantity of ashes is again drawn from the large heap, soaked and turned in the same manner, and thrown on the top of the first; and so on, until the whole is finished and thrown up in a conical heap. This is the first stage. The heap is now allowed to stand for about ten days, or longer if the walks are not ready. By that time the ashes will have absorbed the tar thoroughly, and will appear to be much drier than at first, when the same operation of turning the heap by small quantities at a time, and soaking with tar, is again repeated as before, the object being to add just sufficient tar to make the ashes "sticky" without making a puddle of them. The evil of too much tar is that the walks are soft, and the tar comes up to the surface in the rolling. For this reason it is better to leave the heap to drain for a week or so after the second turning also.

This much being accomplished and supposing all to have gone right, it will now be time to make the walks. Some fine morning, and when there is a prospect of the weather being dry for a day or two, all the barrows are put in action. Two men are set to fill, with strict injunctions to take the heap straight forward as it comes, as the ashes are always wettest in the center of the heap, and driest at the sides; and two are set to spread the asphalt on the walks as it arrives, about three inches deep, with iron rakes, using the back or teeth of the rake as may be needful, and taking care to have the walk slightly round in the middle. Putting on or spreading the asphalt does not take so long as might be imagined —six or eight men will cover one hundred yards of walk, six feet broad, in about three hours. After spreading, the walk is then rolled with a heavy roller, two men pulling it slowly along, and one going behind, sweeping the asphalt off with a besom as it sticks to the roller, whose duty it is also to wash the roller at the end of each journey. After being rolled for an hour or two until it is middling firm, the walk will be ready for sprinkling with the spar or gravel. Whatever material is used, it should be got ready beforehand. Derbyshire spar mixed with shale, gives the walks a clean, smart appearance; but common river gravel, put through a half inch sieve, would do well, and would give the appearance of a smoothly-rolled gravel walk. The spar is sprinkled on regularly with the hand, and just thick enough to hide the black surface of the asphalt, then rolled in with the roller until the walk is smooth and firm, when it is finished and fit for traffic. It should, however, be rolled for three or four mornings in succession, before the sun gets strong, in order to insure a firm "set."

The objections which have been urged against asphalt walks for gardens are that in hot weather the tar smells disagreeably, and that it is injurious to box-edgings and the roots of trees. As regards the smell, it soon almost disappears, and even in very hot weather it is never so perceptible as to be in the least disagreeable. Box does not thrive very well if it has not got established before the walks are asphalted; but when it becomes well rooted, it thrives as luxuriantly as could be desired. Stone edging, which is neat and substantial, resists the hardest frost, harbors no vermin, and saves much labor, is in every way superior to box for the kitchen-garden.

Mary Somerville.

One of the most remarkable women of the age is Mrs. Somerville. It is particularly appropriate to speak of her at this time, as she has just put forth a very able work upon Molecular and Microscopic Science, which is attracting much attention, both on account of its intrinsic merit, and the advanced age of its gifted authoress.

Mrs. Somerville was born at Jedburgh, in Scotland, about 1796. Her father was Vice-Admiral Sir William Fairfax. Her first husband was Samuel Gray, Esq., a man of considerable ability and acquirements, who taught her the elements of mathematics and the physical sciences. After his death she was married to William Somerville, M. D., of Edinburgh.

The successive steps by which she has gained distinction, are well enumerated in the following extract from the *Edinburgh Review* for July.

"The world is not unfrequently called upon to admire the keen interest and powerful grasp which veterans foremost in the ranks of science retain in their various pursuits up to the latest moments of an advanced age. It is, however, we believe, a case without a parallel in the annals of science that a lady in her eightieth year should publish a work containing a complete review of some of the most recent and abstruse researches of modern science, describing not only the discoveries in physics and chemistry, but especially the revelations of the microscope in the vegetable and animal worlds. Before many distinguished cultivators of the sciences she loves so well were born, Mrs. Somerville had taken a place among original investigators of nature, as in 1826 she presented to the Royal Society a paper on the magnetizing power of the more refrangible solar rays. This communication is printed in the 'Philosophical Transactions,' and led to much discussion on a difficult point of experimental inquiry, which was only set at rest some years later by the researches of Riess and Moser, two distinguished German electricians, in which the action upon the magnetic needle was shown not to have been caused by the violet rays. In 1832 she published her 'Mechanism of the Heavens,' and in 1834 she became still more widely known by the appearance of her 'Connection of the Physical Sciences,' and the 'Physical Geography.' These works have passed through many editions, and have been translated into several foreign languages; whilst in this country her services to geographical science have been recognized by the award of the Victoria medal for 1869 of the Royal Geographical Society. In her work on 'Molecular and Microscopic Science,' the gift of lucid description, so characteristic of the distinguished authoress of the 'Connection of the Physical Sciences,' is as conspicuous as ever; but that which most forcibly strikes the reader of these pages is the extraordinary power of mental assimilation of scientific facts and theories which Mrs. Somerville displays."

Japanese Art.

The experience of the last few years during which the long-closed gates of the Japanese Empire have been open to us, has naturally enlarged our knowledge as to that peculiar people.

Resembling, as might be expected, the products of the neighboring country of China, the fabrics of Japan are, however, far superior to those of the Flowery Land, and this not only in mechanical execution, but in freedom of design and fertility of invention. The works of the Japanese workman, particularly if regarded in an artistic point of view, display an energy of individual thought strangely contrasting with the conventional uniformity, the mental paralysis which, possibly resulting from political causes, has ever since the earliest date of modern history afflicted the wonderful people to whom may undoubtedly be ascribed the invention of

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several of the mightiest, the most essential aids to civilization.

This superiority of the Japanese is, as may be expected, more clearly visible in the representation of living figures, and particularly of the human form. Nothing can offer a more vivid contrast than the egg-shaped simpering faces, the entire absence of anatomy so long familiar to us on Chinese fans or porcelain, when compared with the vigorous muscular developments, the expressive countenances, and the ever-present sense of fun which pervades even the common picture-books of Japan. Printed and colored by blocks, and obviously very cheap, their amount of artistic power is truly remarkable, and the Japanese schoolboy has needed no Felix Summerly to stand up for his rights to be nourished on good mental food so far as relates to art. It must be admitted that decorum might at times be better guarded. These cheap books are mostly pervaded by a spirit of cariacature, tending, as by its nature cariacature must, to exaggeration. But the Japanese artist can, if he will, confine himself within strict academic limits without thereby sacrificing force.

A class of ornaments peculiar to these islands may, from their small size, have met with less attention from the ordinary visitor than their merits deserve. We allude to the small steel or bronze carvings which the Japanese wear at their girdles, which—to use the language of the seafaring—have a ribbon rove through them to support a tobacco-box, much like the watch, chain, and seals of the past generation. Some of these will repay close examination. Small in size, for they are rarely larger than an almond shell, they contain but one or two figures, a captive in his dungeon, or a huntsman stabbing a boar, but of singular vividness and breadth of execution.

We have in recollection at this moment, a wizard "so lean his eyes were monstrous, while the skin clung but to crate and basket, ribs and spine," that might have sat to the laureate for his life-like word portrait of Merlin's brother enchanter. Hitherto, however, all the specimens of Japanese art which have reached England have been ordinary marketable commodities, procurable by any one with a moderate command of ready cash, and it is with much interest that we can now contemplate a specimen of what they themselves regard as an individual specimen of high art. Dr. A. Barton has lent to the South Kensington Museum, England, a painting well known to the critical community of Japan, and which indeed—so we are informed—had to be brought away with some precautions to avoid the risk of a governmental embargo. The picture is in water color on silk, or possibly the admixture of silk and paper peculiar to that country, and represents a tiger, life-size, or to speak with strict accuracy, of the size of a leopard, though the colors are those of the huge tiger of Bengal. The animal is in a singularly bold position, giving ample play to the skill of the artist in foreshortening. The body clings to a huge rock, the hind leg appearing on one side, the fore leg on the other, while the chief mass of fur appears above the top of the stone. The creature is gazing at an unseen foe, the eyes fiercely expressive, the formidable jaws open, and the skin flattened over the skull, in the manner any one may observe in the common cat when excited by fear or rage. The most wonderful point in this very curious picture is the manner in which the fur is painted. Each particular hair seems to stand on end, and so accurately are brought out the spiral radiations of separate hairs from a central nucleus that more than one observer has been convinced that they had before them an actual skin and not a pictorial representation. This error is the more easy to fall into, as the chief defect in this marvelously vivid imitation is its want of shadow. This, the common fault in Oriental paintings, causes the limbs to lie flat against the rock and spoils what would otherwise be an almost complete deception. The accessories of the picture, a waterfall, and mossy stones, are dashed in with a singularly bold carelessness which, to speak truly, renders it somewhat difficult to decide what the painter meant by his conventional dabs and smears.

What Are Brittleworts?

The Diatomaceæ, or Brittleworts, are unicellular microscopic plants, so numerous that there is hardly a spot on the face of the earth, from Spitzbergen to Victoria Land, where they may not be found. They abound in the ocean, in still running fresh water, and even on the surface of the bare ground.

They extend in latitude beyond the limits of all other plants, and can endure extremes of temperature, being able to exist in thermal springs, and in the pancake ice in the south polar latitudes. Though much too small to be visible to the naked eye, they occur in such countless myriads as to stain the berg and pancake ice wherever they are washed by the swell of the sea; and when inclosed in the congealing surface of the water, they impart to the brash and the pancake ice a pale ocherous color.

Some species of diatoms are so universal that they are found in every region of the globe; others are local, but the same species does not inhabit both fresh and salt water, though some are found in brackish pools. The ocean teems with them. Though invisible as individuals to the naked eye, the living masses of the pelagic diatoms form colored fringes on larger plants, and cover stones and rocks in cushion-like tufts; they spread over the surface as delicate velvet, in filamental strata on the sand, or mixed with the scum of living or decayed vegetable matter, floating on the surface of the sea; and they exist in immense profusion in the open ocean as free forms. The numbers in which they exist in all latitudes, at all seasons, and at all depths—extending from an inch to the lowest limit to which the most attenuated ray of light can penetrate, or at which the pressure permits—are immeasureably in excess of what we have been in the habit of assuming. Temperature has little to do with the distribution of diatoms in the tropics; it decreases with the depth at a tolerably fixed rate, till it becomes stationary. It increases in the polar regions with the depth, and approaches the standard, which is probably universal, near the bed of the ocean.

Diatoms are social plants crowded together in vast multitudes. Dr. Wallich met with an enormous assemblage of a filamental species of Rhizosclenia, which is from six to twenty times as long as it is broad, aggregated in tufted yellow masses, which covered the sea to the depth of some feet, and extended with little interruption throughout six degrees of longitude in the Indian Ocean. They were mixed with glistening yellow cylindrical species of such comparatively gigantic size as to be visible to the naked eye.

Other genera constitute the only vegetation in the high latitudes of the Antarctic Ocean. Dr. Hooker observes that without the universal diffusion of diatoms in the south polar ocean, there would neither be food for the aquatic animals, nor would the water be purified from the carbonic acid which animal respiration and the decomposition of matter produce. These small plants afford an abundant supply of food to the hervivorous Mollusca and other inhabitants of the sea, for they have been found in the stomachs of oysters, whelks, crabs, lobsters, scallops, etc. Even the Noctiluci, those luminous specks that make the wake of a boat shine like silver in a warm summer night, live on the floating pelagic diatoms, and countless myriads are devoured by the enormous shoals of Salpi, and other social marine animals.—*Mrs. Somerville.*

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Improvement in Construction of Smelting Furnaces.

MESSRS. EDITORS:—As a reader of your excellent journal I have been much interested in the various articles published on the manufacture of iron, steel, etc.

My object in writing to you is to call attention to the manufacture of pig iron, and to get information and suggestions. I believe there is yet much improvement to be made, but not altogether in the direction now generally pursued.

If I am right, the principal improvements of late consists in building the stack much higher than formerly, in order to utilize the heat and more thoroughly prepare the stock for melting; second, to greatly increase the temperature of the blast, in order to perfect the melting when the stock arrives at the proper point, or "bone," as I believe it is called.

I have been engaged in melting iron in a cupola for a number of years, and for the past two years have changed the construction of the inner walls of the cupola and tweers, and for the past twelve months have accomplished much in utilizing the heat, and have consequently made a large saving of fuel. We use ninety graduated tweers in a cupola 36 in. in diameter. This arrangement thoroughly distributes the blast through the coke in place of chilling it, as it does in the ordinary way.

I am not aware that this plan has been tried in a blast furnace, although various patents have been granted. No patent, however, has been allowed for this specific arrangement or thing like it. If it could be used, and the same result attained in the manufacture of pig iron it would be a very important advance in the right direction. It is the opinion of practical men that it can be, and the hot blast dispensed with, but with the hot blast perhaps better results would be obtained.

I send the result of one day's work, and although it is somewhat better than the average year's work, it is not materially so.

COKE.		IRON.	
No. of charges.	Total.	No. of charges.	Total.
1 or bed	1,400	1	5,000
2 of 120 lbs. each	240	2 of 1,000 lbs. each	2,000
19 of 100 lbs. each	1,900	19 of 1,000 lbs. each	19,000
6 of 80 lbs. each	480	6 of 1,000 lbs. each	6,000
	4,020		32,000
Coke returned not burned	875	Iron returned not melted	462
Coke actually burned	3,145	Iron actually melted	31,538

One pound of coke melted ten pounds of iron. Loss in melting, two per cent.

Amount of limestone charged per tun, 50 pounds.

Size of cupola across the tweers, 36 inches.

Size of cupola above the tweers, 48 inches.

Hight to charge hole, 13 feet.

Two cylinders, each 36 inches in diameter, 30-in. stroke.

No. of revolutions per minute, 60.

Cubic feet of air per minute, 4,241.

Time in melting, 1 hour and 40 minutes.

Cincinnati, Ohio. R.

A Recommendation to "Many Farmers."

MESSRS. EDITORS:—In a recent issue of the SCIENTIFIC AMERICAN, my attention was drawn to the request of "Many Farmers," for an invention that would enable them to utilize waters running through their lands to waste while their corn crop is suffering by drought. To my mind it seems that if "Many Farmers" would club together and purchase one of the steam engines now in use to extinguish fires, they might draw the water from a considerable distance and throw showers over their fields at pleasure. These machines are portable and readily conveyed from one distant point to another, and if expensive at first, their utility would soon cover the cost, and the annual interest on the sum invested would be less than ditching, or pipes, etc.

In the same issue a substitute is wanted for the present cruel "method of branding cattle." It occurred to me that a chemical compound could be employed; say, Quicklime, 1 oz. ounce; niter, ¼ ounce; orpiment, 3 drachms; sulphur 1 drachm; soap lees, 4 ounces, mixed and evaporated to a proper consistence to print with, or lime and water mixed to a thick cream, and passing through the mixture 25 or 30 times its volume of sulphureted hydrogen gas till the gas begins to escape, then stop the process. This pulpy mass laid on the hair for 12 or 15 minutes, then washed off with a sponge, will remove the hair as well as burning. The rain might do the washing off.

Perhaps this may suggest to your own prolific minds a still better compound. J. STAUFFER.

Lancaster, Pa.

The Premium Offered on a Time and Percussion Fuse by the Swiss Government.

MESSRS. EDITORS:—The Swiss Government, according to statements made in the Swiss newspapers, offers a premium of £2,000 in gold for the best time and percussion fuse for shells, and names Oct. 1st, 1869, when models are to be presented to the military department at Berne.

Inventors would like to know—First, is the notice official? Second, are inventors of all nations invited to compete? Third, is it not a time and concussion fuse that is desired? Fourth, is the fuse to be attached to the shell and fired? Fifth, what kind of rifle shell is used?—Is it on the button system, which allows windage and ignites the fuse without a fulminate, or is the sabot of such construction as to cut off all windage and thereby require a fulminate to light the fuze?

Any official facts published in your paper relating to the above would much oblige inventors in this country.

Washington, D. C. THOMAS TAYLOR.

[We have not seen the notice referred to and cannot answer the inquiries made. Perhaps some of our correspondents may be able to give the desired information.—EDS.

Editorial Summary.

MOUNTING small insects for the microscope, such as parasites and acari from birds, beetles, etc., may be performed by placing the live insect on the inside of a sheet of tolerably good note paper, folded, and when in the act of running, closing the paper and pressing it tightly in a book. By this means the legs and antennæ may be nicely extended, all the expressed moisture absorbed by the paper, and the skin left apparently unbroken. It should be allowed to remain in the book about two days, when it may be carefully removed from the paper, put in the turpentine bath, and afterward mounted in balsam in the usual way.

TURPENTINE AS A REMEDY FOR LOCKJAW.—The *Medical and Surgical Reporter* notices the communication of one of our correspondents in regard to turpentine as a remedy for lockjaw. It says it is one of the numerous remedies long known to physicians, and that its efficacy cannot be relied upon with certainty. The fact is that lockjaw is one of the most obstinate complaints physicians are called upon to treat, and no remedy has been yet found which certainly masters it. The Calabar bean has been lately tried with considerable success, administered hypodermically. This remedy is not, however, a new one, and has failed in many instances.

WE hope no reader will fail to peruse the article entitled "Patents or No Patents," published in another column. They will find therein much that is instructive as well as amusing, and will become convinced of three facts: First, that English workingmen are not such asses as Sir Roundell Palmer and Mr. Mcfie evidently took them to be; second, that the patent laws of that country are not likely to be repealed; and, third, that the American patent laws are, as a whole, superior to those of England, if not to those of any other country on the face of the earth.

THE poor children of Philadelphia, says the *Ledger*, are largely interested in the peach kernel trade. They extract the kernels from the "stone," put them upon strings, or threads, in bunches numbering from one to five hundred, and sell them to the druggists. The price is one cent a hundred, and an industrious gleaner might, possibly, collect, crack, and string 500 in a day; so that those urchins in the trade are not likely to be called on to pay income tax. The kernels are used, principally, for making alcoholic "bitters," and are chiefly valuable for the hydrocianic acid to be procured from them.

KENNEDY'S PATENT SADIRON.—The inventor of the sadiron, illustrated and described on page 116, current volume, desires us to state that the bracket and pulley arrangement for taking up the slack in the flexible gas tube, is only necessary on very large work. For ordinary domestic use it may be dispensed with, the simple flexible tube of the proper length affording ample play for the iron.

"COSMOS" says that while some drainage works were being executed at Vielsalm, province of Liege, Belgium, the workmen found, at no great depth under the surface, a piece of native copper, weighing about four and a half pounds, and partly hollow inside exhibiting crystals. This discovery led to some further research, which resulted in finding some veins of malachite.

Unless glass is carefully annealed and thoroughly well made it is apt to cool unevenly; this does not affect the transparency or its appearance, but is discoverable on examination by polarized light.

STEREOTYPING by the paper-machie process was invented by Genaux, of Paris, in 1829.

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Improved Machine for Boring and Mortising Blind Stiles.

This machine, as illustrated in the accompanying engraving, embraces all the features of the machine for which a patent was granted to Leonard Worcester, July 5, 1859, together with several other valuable improvements for which a patent is now pending, and which, it is claimed, render it the most efficient machine for the kind of work it is designed to execute on all kinds of stock now manufactured.

Machines have been made for some time that would mortise soft lumber free of knots and shakes, but none before this have had the necessary combination for both boring for revolving slats, or mortising for fixed slats, in all kinds of stock, hard or soft, clean stock or knotty and shaky timber, and for leaving the mortises free from chips ready for the insertion of the slats.

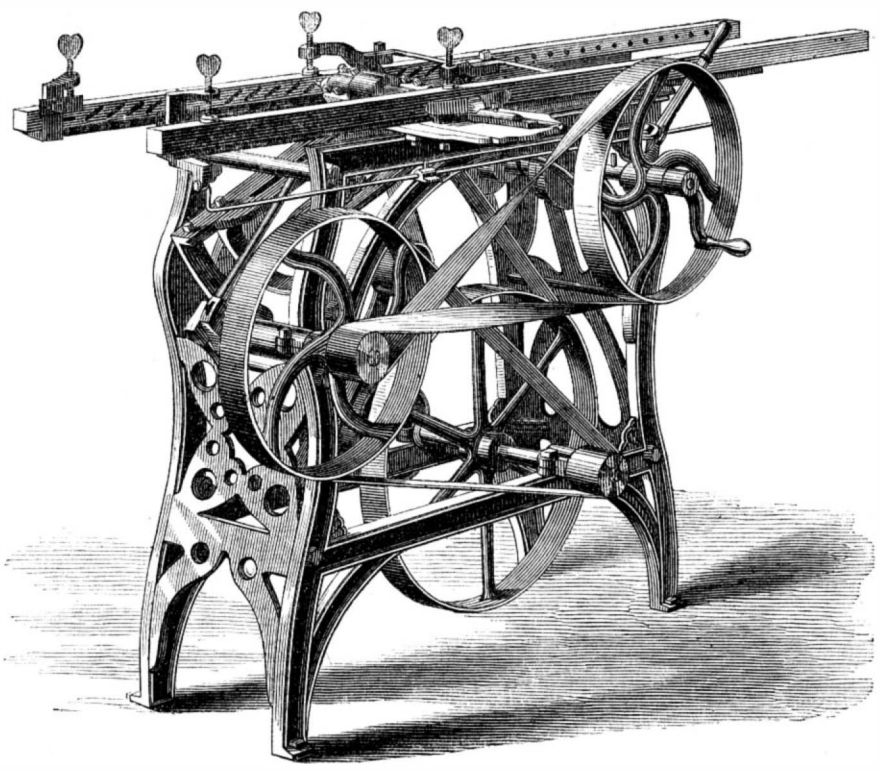
This machine is entirely automatic in its operations, either boring round holes for the pivots of revolving slats, or mortising the recesses for the ends of fixed slats. In cutting these recesses it can be adjusted to make them at any required angle. The cutting of the recesses is done by means of a reciprocatory or traversing burr or bit, which, we have already said, can be used in any obstinate description of wood, where ordinary machine chisels fail. It will also make the mortises any length from a round hole up to two and one half inches, and of any width or depth required in a window blind.

All the operator has to do is to put in the stiles and set the machine in motion, when it does its work, and, having done it, stops. It does the work on both stiles at once at the rate of sixty mortises per minute. One man, the inventor asserts, can set out and mortise from 125 to 150 pairs of blinds per day with one machine.

The bit or burr is a very simple device, not liable to be broken and easily kept sharp. It costs only ten cents.

The machine is very simple in construction and is made wholly of iron and steel. It is thoroughly built and easily set up and put in operation, and is not liable to get out of order. Not more than one half a horse power is required to run it.

It is peculiarly adapted to the work on car blinds, where the mortises are less than one eighth inch in width, and, consequently, difficult to make with chisels of ordinary construction. Agents for its introduction throughout the United States are wanted. For further particulars address Martin Buck, agent, Lebanon, N. H.



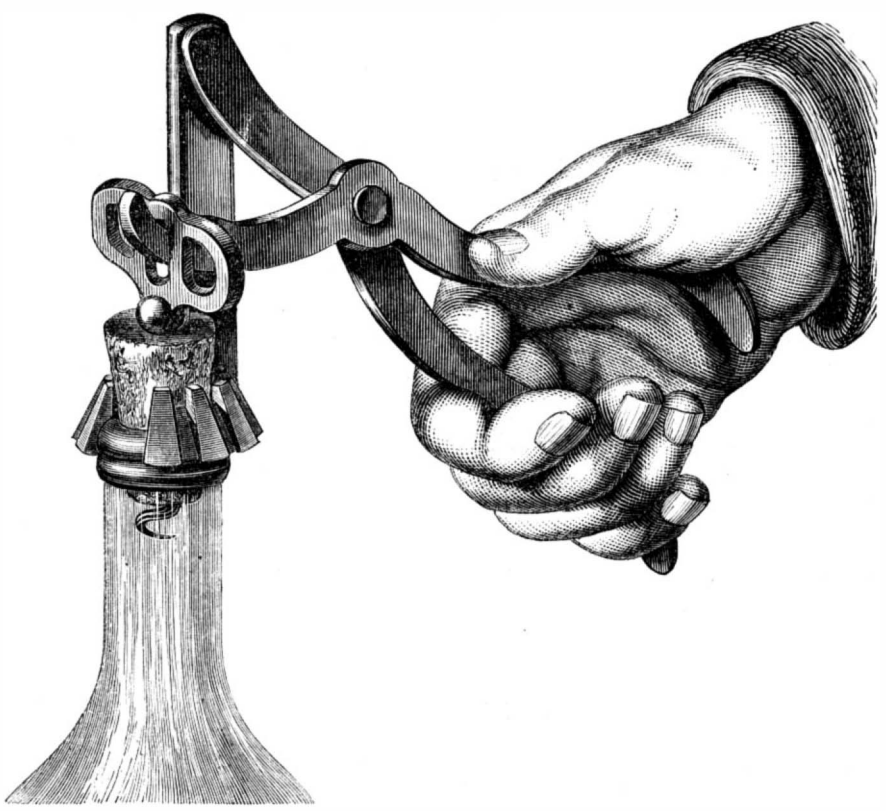
BLIND STILE BORING AND MORTISING MACHINE.

Improved Cork Extractor.

Our engraving shows a simple and powerful implement for extracting corks from bottles, patented Jan. 14, 1868, by James Morton, of Philadelphia. It consists of three bars pivoted together, which, together with the corkscrew, constitute the entire apparatus. One of the bars has a socket or cap at its lower end, which is placed on and around the nose of the bottle. Near the upper end of this first post or bar is pivoted the end of the second bar, near the middle of which the third bar is pivoted. The second and third bars have handles at their outer ends, and at the inner end of the third bar is a hook.

This hook engages with the corkscrew in the manner delineated in the engraving, and by forcing the handles together or pressing them downward, the cork can be easily extracted. The instrument is equally adapted to extracting corks on which rings or hooks are already formed so that no corkscrew is needed.

For further particulars address James Morton, 912 South Eighth street, Philadelphia, Pa.



MORTON'S DOUBLE-LEVER CORK EXTRACTOR.

A Deserved Testimonial.

A few days since Moses G. Farmer, Esq., of Salem, Mass., was presented with a sardius, or red carnelian intaglio, of Sir Isaac Newton, estimated to be about 200 years old, by S. W. Dewey, of this city, in consideration of his electrical investigations and inventions. This latter gentleman, in presenting it, stated that since being its proprietor he had often thought he would present it to Professor Morse, in token of the great good he had conferred upon the human family by his telegraph inventions, but lately he had become convinced that Mr. Farmer, the inventor of the fire-alarm telegraph and the American compound telegraph wire, was eminently deserving of it. Mr. Dewey received the intaglio from a Mr. Bishop, late of New York, who received it from his father, who was a diamond setter to the sovereigns of England, France, Spain, and Portugal, and the records held by him of the jewels he had in his possession were such as to leave no doubt as to the antiquity of the gift and the probability that it was taken from life.—*Boston Traveler.*

Professor Tyndall.

The following agreeable personal sketch of Prof. Tyndall, by a correspondent of the New York *Tribune*, will be perused with interest by our readers who have so often seen his name in these pages:

"One of the most agreeable features of my brief visit in London was the acquaintance, which, through the kindness of friends at home, I was enabled to make with several eminent scientific men whose names are cherished with equal honor on both sides of the Atlantic. Soon after my arrival I called on Prof. Tyndall at his rooms in the Royal Institution, a learned society, which, from the commencement of the present century, has exerted a marked influence on the development and popular diffusion of scientific knowledge in England. Its history is illustrated by some of the most important discoveries of the age in the natural sciences, including the labors of Count Rumford, Sir Humphry Davy, Faraday, and Prof. Tyndall himself, whose enthusiastic, poetical temperament and remarkable gifts of expression, combined with the habit of rigid scientific analysis, have contributed largely to create and gratify the taste for popular science, which prevails among a very considerable portion of the cultivated classes in English society.

"Prof. Tyndall has all the ardor of a reformer, without any tendency to vague and rash speculations. Recognizing whatever is valuable in the researches of a former age, he extends a gracious hospitality to new suggestions. With a noble pride in his favorite branches of inquiry, he is not restricted to an exclusive range of research, but extends his intellectual vision over a wide field of observation. The English, as a rule, are inclined to be suspicious of a man who ventures beyond a special walk in the pursuit of knowledge. They have but little sympathy with the catholic taste which embraces a variety of objects, and is equally at home in the researches of science, the speculations of philosophy, the delights of poetry, and the graces of elegant literature. But a signal exception to this trait is presented by Prof. Tyndall. His mind is singularly comprehensive in its tendencies, and betrays a versatility of aptitude, and a reach of cultivation, which are rarely found in union with conspicuous eminence in purely scientific pursuits. In his own special domain, his reputation is fixed. His expositions of the theory of heat and light and sound, and of some of the more interesting Alpine phenomena, are acknowledged to be master pieces of popular statement, to which few parallels can be found in the records of modern science. But in addition to this he possesses a rare power of eloquence, and manifold attainments in different departments of learning. I do not know that he has ever written poetry, but he is certainly a poet in the fire of his imagination, and in his love for all the forms of natural beauty. Nor has he disdained to make himself familiar with the leading metaphysical theories of the past age, in spite of the disrepute and comparative obscurity into which that science has been thrown by the brilliant achievements of physical research. I noticed with pleasure in his conversation his allusions to Fichte, Gœthe, R. W. Emerson, Henry Heine, and other superior lights of the literary world, showing an appreciation of their writings, which could only have been the fruit of familiar personal studies. Besides the impression produced on a stranger by his genius and learning, I may be permitted to say, that I have met with few men of more attractive manners. His mental activity gives an air of intensity to his expression, though without a trace of vehemence, or an eager passion for utterance. In his movements he is singularly alert, gliding through the streets with the rapidity and noiselessness of an arrow, paying little attention to external objects, and if you are his companion, requiring on your part, a nimble step and a watchful eye not to lose sight of him.

"Though overflowing with thought, which streams from his brain, as from a capacious reservoir, while his words 'trip around as airy servitors,' he is one of the best of listeners, never assuming an undue share of the talk, and lending an attentive and patient ear to the common currency of conversation, without demanding of men the language of the gods. The singular kindness of his bearing, I am sure, must proceed from a kind and generous heart. With no pretense of sympathy, and no uncalled-for demonstrations of interest, his name will certainly be set down by the recording angel, as 'one who loves his fellow-men.'"

Prof. Horsford's Method for Making Bread.

In a recent letter from one of our correspondents, it was asserted that Prof. A. J. Bellows had charged that the preparation for raising bread, patented by Prof. Horsford, was poisonous in its nature, that it was simply phosphorus disorganized, whatever that may mean, and as such, as dangerous as any other poison, etc., etc.

To this statement, which we published without comment we say that after taking time to consider the possibility of the occurrence of free phosphorus during any stage of the process from the bones to the bread, we see no room for admitting any such possibility on chemical grounds.

Second, we have eaten of bread, pastry, etc., prepared by this method, for months and do not find ourselves poisoned so far as we are able to discern.

Third, the testimony of many eminent chemists, among whom Liebig stands first as undoubted authority on a question of this kind, not only declares it harmless, but beneficial to health. And we have no hesitation in saying that all statements to the contrary have no scientific or practical foundation, and they could not be made by a scientific chemist, who, in addition to learning, possessed that other essential of reliable judgment—candor.

Do Animals Think?

We have been asked to give our opinion upon this subject which has been recently debated in Tennessee. There has been no doubt in the minds of many eminent thinkers and observers that animals think and reason. We fully coincide in this belief, and think that a careful examination of their habits and acts will convince any candid observer that they are not wholly, although doubtless to a great extent, governed by instinct. Those to whom our columns are familiar will recollect a number of articles containing facts which go to prove the reasoning power of animals.

THE Board of Trade of St. Louis has appointed a committee of twelve to raise by subscription $120,000 to build an iron sea-going propeller to inaugurate direct trade between St. Louis and foreign ports. The vessel will be of 1,000 tuns capacity, and will not draw over six feet when light.

IT is stated that one hour after the gas of London is lighted the air is deoxidized as much as if 500,000 people had been added to the population.

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WHAT KEEPS SOLID BODIES HEAVIER THAN WATER SUSPENDED IN A RUNNING STREAM?

The question here propounded is one of more practical importance than at first sight it may appear. As the sole object in increasing the velocity of the flow of water in rivers by means of dikes and other appliances is to enable the water to keep suspended, or, not to beg the question, to enable the solid matters to remain suspended in the water, so that they will not deposit in the form of bars, it becomes important to be able to ascertain the precise amount of narrowing and straightening that will secure the desired velocity; and the question with which we have headed this article is certainly important in deciding the question of velocity.

To use the words of an able cotemporary, *Engineering*, in an article entitled "Fluvial Abrasion," contained in its issue of June 25th, "Velocity alone is needed to convert half a gallon of shot and half a gallon of water into a plumbeous porridge; indeed, lead, or anything, however heavy, will swim in water if the water only runs sufficiently fast."

Engineering goes on to criticise the views of one of its correspondents in regard to this subject, but in our opinion it makes one rather serious mistake, especially as in the article referred to it assumes the *rôle* of "philosopher," which it plainly tells its correspondent he is not, although an "able and conscientious engineer." It says, "Mr. Login arrives at what we think must be an erroneous conclusion in deducing from various premises that a certain amount of the energy of running water is absorbed or expended in carrying with it solid matter in suspension. In first putting this matter into motion, power is unquestionably abstracted from the water; but as soon as uniform flow is established the solid matter flows in obedience to its own gravitation, neither receiving from nor imparting to the water any power whatever.

"Its tendency to continue its onward motion is sufficient to overcome gravitation, and as it moves with water of its own velocity, it is in equilibrium 'fore and aft,' and thus it moves on with no resistance whatever, unless it be argued that its rate of advance is less than that of the stream. If so, it would drop at once, and the conditions of flow would cease."

If this be philosophy, or if the assumption that uniform flow can be at some time fully established be not begging the question, then have we much left to learn in the elements of physics and logic.

Let us examine this singular proposition in the light of the following well-known and admitted natural laws.

1st. If two or more forces act upon a body at the same time each of these forces produces the same effect as if it acted alone.

2d. The quantity of motion imparted to a body by a constant force is in proportion to the time of the application of the force.

3d. If two forces act simultaneously upon a body in different directions not opposite, it will move in the direction of neither, but in a line between them.

A bed of a river is an inclined plane down which the particles of water roll. If it were perfectly smooth there would be no friction and consequently no wear of the bottom, but as the bottoms of all streams are more or less rough, the projections receive the force of the descending water, and, if the current be strong enough, are forced from their beds and either rolled along the bottom, or, if the impetus is strong enough, are carried out on a line nearly parallel to the base of the inclined plane into the stream. When this has taken place gravity acts upon the body, not in a line parallel to the inclined plane, but in a line perpendicular to its base, which tends to draw the body down to the surface of the inclined plane again by a *constant force* equal to the difference between the weight of the solid floating body heavier than water, and the weight of an equal bulk of water. What counteracts this tendency during any period of time if not the motion of the water? And as the overcoming of the action of a constant force implies a constant exertion of some other force, how are we to escape the conclusion that a constant demand is made upon the momentum of the flowing water to keep stones or sand supported in a current?

The motion of the water obeys the same laws as those of other bodies rolling down an inclined plane; water being practically homogeneous, no part of it seeks by its own gravity to regain the surface of the plane. But a stone carried along by the force of a stream is constantly making this effort. Something prevents it and that something can be nothing else than the water. If stones, or sand and water, were flowing downward by the force of gravity alone in a vertical line, all would move together (not taking into account resistance of the air) at equal velocities for the same points in the line of descent. But in no other case could this occur. As soon as the stream is inclined the heavier body begins to seek the bottom of the channel, and is only prevented from reaching it by absorbing motion from water flowing *more rapidly in a line parallel to the bottom.*

Thus the stone may be said to receive, the moment it attempts to move toward the bottom, an infinite number of kicks from the particles of water which it must check in their flow in order to reach the bottom. It is the game of football repeated; the ball is kept flying, but it takes power to do it.

We have intimated that the speed of solid matters heavier than water must of necessity flow less rapidly in a line parallel to the bottom of the channel than the water which floats them. Many have witnessed the butterfly trick performed by the Japanese jugglers in their exhibitions in this country. It illustrates this truth exactly. Pieces of colored tissue paper are folded to represent butterflies, which, by means of currents of air adroitly produced by fans, are made to float or alight and appear to sustain themselves at the will of the performer. It is a very ingenious and amusing feat, but the same principle is involved in it as in the "plumbeous porridge" of *Engineering*. The heavier bodies are only sustained by the momentum of the more rapidly flowing light fluid.

Again what is the "tendency to continue its onward motion" which *Engineering* says is sufficient to overcome gravity but an impulse received from the water. But admitting for the sake of argument that it has such a tendency in and of itself (its inertia perhaps is meant), the direction of such a force would be in a line parallel to the bottom. On what new principle of physics is it asserted that a force acting at nearly a right angle to the force of gravity will counteract gravity? A proposition at once so entirely void of any foundation in the laws of force and motion, and so feebly sustained by argument will surprise the readers and admirers of our esteemed and usually accurate cotemporary. Does it not also tacitly admit its error when it says that "anything, however heavy, will swim in water if it only runs *sufficiently fast.* Is this not equivalent to saying the heavier the body the greater the velocity in the stream needed, not only to start it, but to *keep it up after it starts*? And what ground is there for asserting that such a body would sink "at once" should its velocity ever become less than that of the water? Let *Engineering* tie a cast-iron plate to a string and then throw it upon a very rapidly flowing stream, holding on tight to the string, and report the result. The experiment will be nothing more than flying a water kite.

ORNAMENTAL PAINTING OF BUILDINGS.

Why it is that the American people run so much to the somber colors in the painting of houses and outbuildings, is an æsthetical question we leave for others to discuss. The general lack of taste generally displayed in the selection of tints is, however, only too palpable. One has only to take a ramble through one of our cities to demonstrate this fact. Rows upon rows of dull and dismal looking dwellings may be met with, painted dark-brown or a dirty-looking drab, with blinds of a color suggestive of nothing but mud.

The combinations of color frequently met with are positively hideous. There is a drab colored house which we are obliged to pass frequently, with sky-blue window casings and blinds, and a sort of balcony in front with an utterly unheard of color, one might suppose to have been compounded of all the pigments scraped from the bottoms of the pots in some painter's establishment for a year, ground together into a dauby, dingy hue altogether indescribable. This house is enough to throw a man of good taste into spasms of disgust. Nor is it a solitary instance except in the depth of depravity to which the taste of its would-be decorator has sunk.

Summer relieves the eye somewhat when its soft green covers the earth, but when winter comes these abortions of color stand out in revolting deformity. Here is a frame house which the painter has attempted to make look like a brownstone, and in doing so has made it look like a prison house of woe. There is what would have been a pretty little cottage if it had not been spoiled by Spanish brown. Back of it stands a carriage house of a leaden blue color. Yonder is a large mansion of brown stone, stately in its proportions and with a well designed front, the effect of which is spoiled by interior blinds with white frames and yellow slats.

In rural districts these defects are carried still further, so far as outside work is concerned, while the inside work is for the most part left bare and plain. Where any attempt at decoration is made, however, neutral tints without meaning are generally employed.

Nothing like attention to a general tone, and no reference whatever to the colors of carpets or furniture, is to be discovered in ninety-nine cases out of a hundred. All is a mass of incongruity from beginning to end.

The grossness of the fault being admitted, to what is it chargeable? In part to the bad taste of people at large, but most to the imperfect knowledge of painters, who, as a class, are sadly deficient in the knowledge of harmony in color, and whose instruction is mainly confined to grinding colors and manipulation of the brush.

If house painters could only be made to realize the value of the study of color, and to understand that the really great in the art are so chiefly because of their superior knowledge in this respect, improvement might be expected. There is no longer any excuse for ignorance. The researches and works of Chevreul, and others, have provided the necessary means whereby any intelligent painter may obtain the proper instruction.

Much doubtless depends upon natural talent in this as in other arts; but still we feel justified in asserting that in this country, at least, the house painters are far more deficient in the knowledge necessary to a high degree of skill than mechanics in other occupations. We do not suppose all house painters will become artists even with the knowledge which all ought to possess, but it is certain that no one will ever perform superior work without it.

LABOR-SAVING MACHINERY AND CO-OPERATIVE LABOR.

The value of labor-saving machinery is a subject which we have often discussed in these columns, and we should not now return to it were it not that we sometimes meet the assertion, that the extended use of labor-saving machinery has created a disability on the part of labor to compete with capital. We cannot suppose any one in this enlightened age will claim that anything calculated to constantly put power into the hands of one class, at the expense of another, not to say a very much larger class, could ultimately lead to anything but tyranny on the one hand, and abject servitude on the other.

The condition of labor, at the present time, is, we maintain, better, on the whole, than at any previous time in the history of the world. Slavery and serfdom are nearly extinct throughout the civilized world, and if wages be estimated, not in dollars, but in comforts of life received as the reward of industry, they are higher now than at any previous period. Of course, we do not, in this statement, take into account any temporary difference which might be found upon comparing the prices of to-day with ruling prices existing a few years since. What we wish to make plain is, that if a mean be struck, from the commencement of the Christian era to the present time, it will be found that labor has made much greater progress than capital. It will further be found, that the most progress has been made since the introduction of labor-saving machinery, and we assert, that such machinery has been a propelling power, not a resistance to be overcome in this progress.

The peculiarity of the effect of labor-saving machinery, of greatest importance in a social point of view, as affecting the status of classes, is the local concentration of labor, at the same time that it subdivides it into departments. Few manufactures now exist in which more than a part of the article produced is made by a single operative. In the majority of cases, the thing made passes through many hands before its completion. In order that the one article thus manufactured by the help of many workers can be made economically, it is necessary that the workmen should be brought together. This coming together is an element of social power which labor did not possess before the introduction of labor-saving machinery.

The result is association to protect mutual interests, and capital has latterly found it a very difficult matter to usurp undue authority since these associations have fully developed their power. It has enough to do to hold its own.

Labor-saving machinery is the only thing that renders co-operation possible in the mechanic arts. This kind of organization is yet destined to play an important part in the history of civilization.

If these facts are true, and we think them indisputable, labor has not suffered disability, but, on the contrary, has derived increased power to compete with capital from the use of labor-saving machinery, and those who think otherwise base their opinions, we think, upon a too narrow view of the subject.

ELECTRO-PLATING AND GILDING.

Every year adds to the general demand for electro-plated goods, and the experience necessary to produce them in the most perfect manner. The manufacture is based upon what has received the scientific name of electrolysis, that is, the decomposition of compound substances by means of the electric current. The current may be generated, either mechanically, with the ordinary friction machines, or chemically, as in the various galvanic batteries in use. The substance thus capable of being decomposed is called an electrolyte. Every electrolyte contains two or more elements which may be divided into two groups: those which are attracted to the positive pole of the battery, and those which go to the negative pole. These two groups are called *ions*, and those which move to the positive pole are called *anions*, while those which move to the negative pole are called *cations*.

To illustrate this, suppose the substance to be decomposed is sulphate of copper, in solution, and an electric current to be passed through it. Sulphate of copper is composed of copper and sulphuric acid, the latter of which is composed of sulphur and oxygen. Copper is a cation, hence it will move to the negative pole of the battery. Both sulphur and oxygen

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are anions, hence, the acid which the union of these substances forms will move to the positive pole without decomposition, as would be the case were either sulphur or oxygen a cation. The terms *ion, anion,* and *cation,* were first suggested by Faraday. The first is derived from a Greek word, to go, and anion signifies, literally, that which goes upward, while cation signifies that which goes down. These terms are applied to indicate the opposite directions in which substances move when their union is broken up by electrolysis, a word which, literally, signifies to loosen by electricity.

The laws which govern electrolysis are very simple. Bodies, with few exceptions, are only decomposed while in the liquid state, brought about, either by fusion or solution. No elementary substance can, from the nature of the case, be an electrolyte. The direction of the electrolysis depends upon the arrangement of the battery and the amount of it is directly proportional to the quantity of electricity passed through the electrolyte. Those bodies, only, are electrolytes which are composed of a conductor and a non-conductor of electricity. The conductors of electricity accumulate on the negative pole of the battery, and are the cations. The non-conductors accumulate on the positive pole and are the anions. These comprise all the general laws of electrolysis, so far as known.

The positive pole of a battery is now generally called the zincode, and the negative pole the platinode, because when zinc and platinum constitute the metallic plates of a battery, the zinc is positive and the platinum is negative.

Electro-plating consists in the electrolysis of a metallic salt, the object to be plated being connected with the platinode of the battery, as the metals, being electro-positive elements, or cations, will move to that pole, and accumulate upon it.

The objects to be plated must be chemically clean ; that is, they must be entirely free from dust, grease, oxide, or tarnish from any cause. Oxides and sulphides are conveniently removed by polishing with rouge, and grease may be removed by washing with an alkaline solution. The surface thus prepared, the article, having a small slip of metal slightly soldered to the back, if necessary for convenience in attaching the wire, is suspended on a hook so that it is immersed in the electrolyte, or solution of a metallic salt, and the negative pole of the battery being connected by a conducting wire with the article to be plated, while a wire from the positive pole is connected with the electrolyte,the decomposition of the salt, and the deposition of the metallic element contained in it at once commence.

There are, however, many circumstances which may defeat success in electro-plating, and no amount of reading can compensate for practical experience in its execution. The metallic film may be imperfect, owing to the presence of impurities upon the surface of the article to be plated. This can be ascertained by examination, and remedied by the proper cleaning. Sometimes the rapid evolution of gas raises little blisters upon the surface, and at others, the deposit, instead of being smooth and granular, will be rough and crystalline. A great variety of means are employed by experts in the art to remedy these evils, such as wider separation of the poles, increasing the thickness of the conducting wire connected with the positive pole, warming the electrolyte, increasing or diminishing the number of elements in the battery employed, etc., etc. Experience, in these cases, is the best guide, in fact, it is the only one which can, with certainty, be relied upon.

The article, having received a sufficient coating, is washed, dried, and burnished, with the exception of such parts as are desired to remain as deposited, and this completes the operation.

IS THE WEATHER AFFECTED BY SOLAR ECLIPSES?

There is a popular belief that a season in which a solar eclipse occurs is either colder, or that the weather exhibits vagaries not observable in ordinary seasons. The present season has been in the vicinity of New York extremely cool, and more than an ordinary rainfall has taken place. This has not been universally the case, and must therefore be considered merely a local peculiarity of climate.

We have found that popular opinion very often has some basis in fact, although the cause may not be the one generally supposed to account for a given phenomenon. A good example of this is the discovery by Dr. Richardson, in his experiments with the great induction coil, at the London Polytechnic Institution, that arborescent marks may be produced on the bodies of persons struck by lightning, a fact which has been discredited by scientists. The popular opinion in regard to these marks has been that they were the images of trees photographed upon the skin by electrical agency.

Now, although the experiments of Dr. Richardson confirm the production of the marks, they show, that, instead of being images of trees or plants, they are the superficial tracings of blood vessels, which the electric current has followed on account of their greater conductivity.

So in the case of peculiar weather occurring at or near the period of a solar eclipse, we deem it probable that an examination may show the popular opinion to be correct, although the cause may have no immediate connection with the eclipse itself.

There remains, of course, the possibility that climatic peculiarities, thought to be more frequent at such periods, are merely coincident, but there is, undoubtedly, a growing disposition on the part of meteorologists to refer certain atmospheric phenomena to celestial and cosmical influences as their cause.

The subject is one of great interest and we should like to hear its pros and cons discussed. Any of our correspondents who will give us facts bearing upon the subject will be welcomed to our columns. Theory will be out of place until the regular occurrence of peculiar atmospheric conditions in connection with solar eclipses is fully established.

THE DIAMONDS OF BRAZIL.

The diamond-washing establishments in Brazil have recently been visited by the distinguished traveler J. J. von Tschudi. On his way thither he was invited to stay in the neighboring town, Serro, where considerable commerce is going on in this gem. Tschudi was not little surprised when he witnessed how unsuspectingly the dealers intrust their goods. At the request of a friend he was immediately furnished with over 570 carats, or about one quarter of a pound of diamonds, making a value of 21,400 rix dollars.

One of the most remunerative washing establishments (Lavra) of Brazil is, according to Tschudi, that of San Joao de Barro. It is, however, not rich in stones of the first water, or those free from slightest faults, while diamonds of the second and third water are met with quite abundantly. Diamonds of the second water are called such, which exhibit spots, clouds, or flaws; but those having an undecided color, or that are injured by other material faults, are designated as being of the third water.

The washing operation requires considerable skill. For an inexperienced eye it is exceedingly difficult to detect a small diamond among a mass of glittering quartz, talc, or micaceous schist. Tschudi, in spite of carefully searching, and although the gem lay on the top of the sand, was unable to find it. To the keen and well-practiced eye of the negro, however, not a diamond of the size of a pin's head remains unnoticed.

The quantity of gems collected per day amounts to from thirty-five to seventy carats, which is equal to about one hundred and fifty diamonds. The gems collected, from the beginning of the season up to the time of Tschudi's stay, weighed 2,700 carats, and consisted for the greater part of beautiful stones, some of which exhibited a greenish tint, which disappears in grinding.

During the time when the washing establishments were under royal administration, every negro who found a diamond of seventeen and a half carats, received his entire freedom, and presents were awarded to those who found smaller ones. As to the etymology of the term carat, it is derived from the word *kuara,* the coral tree, the red pods of which, when dry, were formerly used for weighing gold dust. Four grains are equal to one carat, 151½ carats being equal to one ounce troy weight.

Dr. Lewis Feuchtwanger, in his treatise on gems, gives the following prices for diamonds in gold currency, viz. ;

2 grains (half a carat), from	$ 68 to $75
3 " " "	80 to 90
1 carat "	110 to 140
1½ carat (6 grains)	200
2 " (8 ")	400
3 " (12 ")	1,200 to 1,400
4 " (16 ")	1,600 to 2,000
6 " (20 ")	3,000 to 4,000

Diamonds differ considerably in their color. Forty per cent are in general colorless, thirty per cent may exhibit a slight tint, and as many may show a decided color. Aside from the limpid or colorless stones, those of a dull whitish or greenish tint are most common. In polishing them some of the colors disappear, when the diamonds will distinguish themselves by their pure water. Light shaded rough stones are therefore not always less valuable than limpid ones. Light-tinged diamonds are more common than deep-colored ones, blue and green are very rare, and bring exorbitant prices.

Tschudi enumerates the following colors which diamonds exhibit : Citron and wine-yellow, brass, ocher, and brown-yellow, but not sulphur-yellow ; light-brown, pink, and red-brown ; rose, peach blossom, and cherry-red ; green in all shades, as pale sea-green, leek color, pistachio olive, thistle-finch color, emerald and bluish green, greenish gray ; light gray, ash gray, smoky gray, pure black and dirty black.

Most colored stones are found in Rio da Bagagne, they also occur frequently in Sincora in the province of Bahia. The most refractory to the cut is the black diamond, such as used for the carbon tool points, which were described in our issue of July 24. It mostly occurs in the latter province, sometimes in pieces of from one to two pounds.

One of the most extraordinary curiosities in the way of diamonds is a crystal inclosing a gold leaf. Dr. Nello Franca, who makes mention of this stone, asserts that the gold is seen as if not imbedded in the diamond at all. This peculiar specimen speaks against the hypothesis of those who consider this gem as having directly originated from carbon or carbonic acid.

PATENTS OR NO PATENTS---THE OPPONENTS OF PATENTS USED UP.

Our readers have been made aware that a movement has been for some time on foot in England to repeal the patent laws of that country. As might have been expected a lively discussion has taken place, and Mr. Macfie and Sir Roundell Palmer, the principal champions in Parliament of abolition, have received some rough handling, both in parliamentary debate and from the press. We learn from the *Scientific Review* that a conference of workingmen was held on Saturday, the 24th of July, at Shaftesbury Hall, Aldersgate street, London, under the auspices of Sir Roundell Palmer, M.P., Mr. Macfie, M.P., and a few other opponents of patent property, to consider the desirability of abolishing the patent laws.

Mr. R. Marsden Latham, of the Inventors' Institute, together with a deputation from the Delegates Invention-right Committee, a body composed of delegates from the Workingmen's Technical Education Committee, the Workmen's International Exhibition Committee ; the Foremen Engineers' Association ; the Workingmen's Club and Institute Union ; the Public Museums and Free Libraries Association, and othe workingmen's organizations, attended to watch proceedings, and if necessary to take part in the debate.

Sir Roundell Palmer, M.P., presided, and in the course of a long address, which though attentively listened to, provoked occasional expressions of dissent, said that the opinion he had formerly held in regard to the patent laws had materially changed, and he had now come to the conclusion that they did more harm than good, and therefore it would be better for the people if they were abolished. (Loud cries of "No"). Some men might neglect their business in the hope that a windfall might fall to them in the shape of some invention, but it was doubtful if one man in twenty drew a prize in the inventors' lottery. In many cases the most useful inventions got into the possession of employers and of capitalists. The legitimate reward of poor inventors would, probably, in the event of the abolition of the patent laws, fall to them much in same way as it did now. There was no analogy between the copyright in a book and the right to a mechanical invention. No two men could ever write the same two books, therefore no author could ever stand in the way of another. Ninety-nine patents when useful stood in the way of the people. (Cries of "No" and "Impossible.") They were monopolies—(cries of "No," and a voice : "Not more so than other descriptions of property")—and a patent was a monopoly given to one man for fourteen years, who had discovered something before any one else, but everyone was in search of the same thing. A stop was put to their exertions, as they could not proceed without paying a royalty to the man who had patented it. He considered that a person who had found out a new invention which might benefit mankind, had no right to block up the way for fourteen years by a monopoly which was called a patent. ("Oh!") Patents stood in the way of the improvement of the people in a far greater measure than they benefited the inventor. (Expressions of dissent).

Mr. J. W. Richardson remarked that the patent laws drove many men out of the country to America, where inventions were appreciated. (A voice : "America has better patent laws, and grants three times as many patents as are granted here." Cheers). He suggested that Greenwich Hospital should be converted into a museum of patents. Greenwich was near to London, and was a better site than South Kensington. He had received a very courteous letter from Mr. Gladstone in reply to an application for converting the hospital into a national patent museum, in which the right Hon. gentleman stated that the subject should have his best consideration. There was a national patent museum in America, which had been productive of great good, and he thought that if a national mechanical and designers' co-operative institution, to assist inventors, could be established in England, it would be productive of much benefit to the community.

Mr. J. R. Taylor, of Gray's Inn, speaking of the cost of obtaining and defending patents, concluded that it was almost an evil for a man to be an inventor and obtain a patent. (A voice : "Then cheapen patents and simplify the law.") He considered that patents for new inventions limited the national wealth. ("Oh!")

Mr. Clarke denounced the monopoly enjoyed by the Post-office and desired by the Government in the case of the telegraphs. This, he thought was a still greater evil than the so-called monopoly which the patent laws conferred.

Mr. Thomas Paterson said that what was wanted by the workingmen inventors of this country was a real security for their inventions—(hear, hear)—and he thought that they were as much entitled to a property in the results of their brain labor and expenditure of time and money in perfecting and elaborating new inventions as authors were to copyright in their books. (Loud cheers). He for one could not accept the finely-drawn sophisticated distinction between copyright and invention-right which Sir R. Palmer, with so much pains and ability, had endeavored to develop in his opening address—(loud cheers)—and he was satisfied that the good sense of the workingmen of England would prevail, and could not be imposed on by such hair-splitting arguments as had been addressed to them by the worthy chairman. (Hear, hear).

He contended that the patent law system was the best practical means of remunerating inventors yet devised—(cheers)—that without encouragement and remuneration inventors would never incur the cost and labor of devising new inventions—(cheers)—that the public introduction of new inventions could only be accomplished in a large majority of cases at great expense—(hear, hear)—and that manufacturers and capitalists would not embark money in publicly introducing new inventions, unless some inducement, such as the patent laws afforded, were accorded to them. (Loud cheers). To abolish all protection to invention would be to hand over all the profits of new inventions to the great capitalists, who would come in and undersell the inventor, which they could then easily do. Patents should be granted free from charge, and a tax might be imposed upon the profits of the patented article. He was one of the honorary secretaries of the Workmen's International Exhibition Committee, and they found that it was almost impossible to get skilled artisans to send new inventions for exhibition, unless some special security was guaranteed to them that their inventions would be freed from piracy. (Hear, hear). He had attended meetings of workingmen at the great centers of commerce, and in all parts of the country, and a general feeling prevailed among them, that the patent laws should not be abolished, but simplified and brought within the reach of all. (Loud cheers). To abolish the patent laws would be to plant the seeds of England's decline—(hear, hear)—and he could assure those of our legislators, who, seeking to obtain popularity, might truckle in favor of such a measure, that, among the working

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classes at least, they should enjoy a popularity they little dreamt of. (Loud and continued cheering).

Mr. Macfie, M.P., touched upon the history of our patent laws, and the condition which always in the olden time attached to patents, that they should not make the article patented dearer to the public—a condition which had long been lost sight of. (A voice: "Patents make things cheaper."—Cheers.) Switzerland had no patent laws, and Germany and Holland had declared against them; it would therefore be impossible long to continue them in this country. He denied that the inventor had any exclusive right in his invention—("Oh, oh!")—but the inventor, whose invention was of national importance, ought to be paid out of the public funds, and he thought it possible to devise a scheme of rewards that should be satisfactory to all parties. (Laughter).

Mr. J. B. Galloway, of Newcastle-on-Tyne, was requested by the secretary to move the first resolution. As put into his hands this resolution was to the effect that the patent laws were "a hindrance to genius, science, and progress, and the progress of the whole civilized world, in however simple a form they may appear;" but he said that after the speeches he had heard he could not agree with this, and he would substitute the following: "That the meeting having heard the statements for and against protection for inventions by the existing patent laws, is of opinion that protection is absolutely necessary as a right, by which inventors may be secured a true legitimate right in their inventions," and to this he would add the second part of the resolution handed to him, resolving to assist in the formation of the proposed Co-operative National Mechanical Inventors and Designers' Progressive Institution, to forward genius, etc., and to obtain for the poor inventors of England the reward for their inventions.

This was seconded by Mr. G. F. Savage, who, in a powerful, close-reasoned speech, demolished the arguments advanced by Mr. Macfie. He mentioned several cases in which patents granted in this country had been refused in foreign countries, the result of which was that in those countries where no patent had been granted no manufacturer had thought it worth his while to make the articles. (Hear, hear). Dr. Normandy, the inventor of the well-known apparatus now in general use for converting salt water into aerated fresh water, patented his invention in this country, and then applied for a patent in Prussia, but the Prussian Government, in their usual style, refused to grant him a patent, and the result was that when the Prussian Government needed a supply of the machines, they found there was no one in that country who had engaged in their manufacture, and consequently that Government had to send to this country to obtain them from the patentee. He also stated that where no patent laws existed inventors invariably left the country and took their inventions to the best market. This was the case with Mr. C. W. Siemens, F.R.S., a native of Prussia, who left that country and came to reside in England, because practically no encouragement was accorded to inventors in Prussia. Mr. Siemen's regenerative furnaces and improvements in telegraphy had augmented our national wealth to the extent of several millions of pounds sterling, all of which was lost to Prussia through having practically no patent laws. As regarded Switzerland, about which so much had been said by Mr. Macfie, he was not aware that the Swiss people had invented anything better than the alpenstock. (Laughter). He believed there were no inventors in Switzerland, and he was sure that none of our manufacturers had occasion to fear competition from that quarter. It was notorious that Mr. Nasmyth, working under a patent, had supplied steam hammers cheaper and better than any manufacturer in the world, and it could be proved from numerous facts that instruments and machines constructed by persons not employed under a patent, were less cheap and less perfect than those that were. (Loud cheers).

The resolution having been put from the chair, was carried by an immense majority, amid loud cheers, only two hands—those of Mr. Macfie, M.P., and Mr. Clarke—being held up against it.

The following resolution was then proposed by Mr. Dunlop, seconded by Mr. Paterson, and carried by the same majority, amid tremendous cheering: "That an amended patent law which would give efficient protection to inventors at a low cost would be of the greatest value to this country, and enable it to maintain its supremacy in the arts."

Previously to the passing of the second resolution, Mr. Macfie made an excited but unsuccessful appeal for an adjournment of the meeting, and assured the audience that he was most anxious to promote the interests of workingmen by his action in the matter. (This statement was received with shouts of derisive laughter from all parts of the room).

LABOR IN CALIFORNIA.

We published last year a statement, copied from California papers, to the effect that more labor was needed there in nearly all departments of industry. This statement was denied by a correspondent, who stated that the report was circulated by those interested in cheapening labor, to the detriment of mechanics in that State, who, it was asserted, were even then more numerous than jobs.

The *Alta California* now states that the State is suffering great injury by the exceptionally high wages which prevail. With the exhaustion of the placers, the immediate cause of very high wages ceased. The value of town property in the mining districts has declined, and the range of employment has consequently been narrowed Combinations, however, have succeeded in forcing the pay for certain forms of labor up to a mark that bears no just proportion to its actual value or the rate at which other labor is compensated. The inequalities in this respect are pronounced by the San Francisco journalist "gross and unreasonable." The circumstance is rendered more noticeable by the fact that in the colony of Victoria, which now yields more gold than California the wages of mechanics and unskilled laborers are not half so high as those which prevail in the latter State.

Alloys Fusible at Low Temperatures.

We have known for some time past, several alloys fusible at temperatures below the boiling point of water. The one commonly known by the name of Newton alloy consists of eight parts of bismuth, five parts of lead, and three of tin. It fuses, according to Pelouze, at 94·5°, and according to Thenard at 90°. The one by D'Arcet, the most celebrated of all, is made of two parts of bismuth, with one part of lead, and one part of tin; it melts at 93°.

In a treatise on chemistry by Pelouze and Fremy, we are informed of another, composed of 5 parts of bismuth, three parts of lead, and two of tin, the fusing point of which comes as low as 91·6°.

Dr. Wood says that there exists another more recent than the latter, which was described in *Silliman's American Journal* as containing from seven to eight parts of bismuth, four parts of lead, and two of tin, to which two parts of cadmium are added. It is said to fuse between 66° and 71°. While engaged in galvanoplastic experiments, M. Lalance used seven to five parts of bismuth to one to five parts of cadmium. The alloy which he thus obtained, fused at the low temperature of 66°. The most surprising feature in this discovery is that its difference from the other alloys consists in the addition of a metal of more difficult fusibility than any of those contained in the ordinary alloy. The cadmium by itself only melts at a temperature of 360° C. The other components, lead, bismuth, and tin, fuse at 312°, 276°, and 230° respectively. Another point worthy of note in the preparation of alloys is the peculiar use made of bismuth. From the undermentioned table it will be at once apparent that the alloys at present in use consist to the extent of exactly one half of their weight of bismuth:

Metals.	Alloy of Newton.	Alloy of D'Arcet.	Alloy of Pelouze.	Alloy of Wood.
Bismuth.....	600	600	600	600
Lead.....	375	300	360	320
Tin.....	225	300	240	160
Cadmium.....	—	—	—	120
	1,200	1,200	1,200	1,200

The next discovery in this field ought to be an alloy fusible at the ordinary temperature.

THE heat of summer is stored up in the ocean, and slowly given out during the winter. Hence one cause of the absence of extremes in an island climate.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The French Government has authorized the French Cable Company to lay a cable from Brest to England.

The soft rock of the Hoosac tunnel has been passed and solid rock struck again so that the contractors will not have so much to do with brick arching as they expected.

The Board of Health of this city has urged upon the Fire Commissioners the appointment of an inspector of kerosene and other burning fluids. The Fire Commissioners referred the request to a committee, and suggested instead, that some instrument capable of testing oil by the general public should be introduced.

The St. Louis County Court has decided to cease further operations in boring the artesian well, already the deepest in the world. The depth reached was 3,843¾ feet, and the water obtained there was very salt. Some members of the court wished to continue the work until the well was 4,000 feet deep, but a majority decided against this on account of the expense; the latest work in boring being nearly forty dollars a day, and the progress made in that time about five inches. The well is to be plugged up at a depth of about 1,200 feet, where pure water can be obtained by pumping.

More than one thousand men are at work on the air line railroad between Middletown and New Haven. A few piles have been driven for the bridge across the Connecticut at the former place, simply to ascertain the nature of the river's bed.

Temperance principles and habits of cleanliness are not likely under present arrangements to make much headway in the City of Brotherly Love. Philadelphia is outgrowing its water supply. What with the low ebb to which the water of the Schuylkill River has fallen, the defective means of utilizing the available supply, and the late deplored conflagration of whiskey, lager beer must be at a premium. It is not often that we are able to give an instance in which our sanitary arrangements can compare favorably with those of Philadelphia; but in this case we are able to point with satisfaction to our abundance of water, and we suggest that our neighbors might do worse than imitate our example in the enterprise shown in the works by which we obtain our Croton supply.

Trade has lately received some impetus here on account of the low rate at which freight could be conveyed to the West over our principal railroads. Goods for Chicago which a short time ago were charged at $1·88 per hundred pounds for first class, $1·60 for second, and $1·27 for third, paid only 25 cents per hundred, while the fourth class, heretofore 82 cents, fell to 18 cents. A nearly equivalent reduction was made in the rates to other places The cause of this is stated to be a supposed violation of an agreement previously made by the great lines engaged in Western transportation, for a fixed rate applicable to all, except by the "all water" route, which, being slow, was 45 cents per hundred against $1·88 by the railroad lines. The difficulty will, it is supposed, be adjusted shortly and the old tariff will again be in force.

The weekly production of cotton at Lowell has amounted to 2,394,000 yards, and the number of spindles in the woolen and cotton manufactories is 457,512.

The great ship canal which is to connect Amsterdam with the North Sea, is now once more in progress, the Government of the Netherlands having relieved the contractors of certain difficulties which for a time hindered the work. The canal will be about fifteen miles in length. The Zuyder Zee is to be shut out from Amsterdam, and the Pampus dam by which this is to be effected is already half finished, and the locks and sluices connected with it are in progress. By this undertaking Holland will add one more to her grand engineering works, but it appears to be an English firm that holds the contract.

What California will one day be, with its healthful climate and fruitful soil, may be inferred from the present enterprise of her population. Already her manufactures are estimated at thirty millions of dollars per annum, and they comprise woolen and cotton factories, iron mills, tanneries, boiler works, brass founderies, saw mills, powder mills, paper mills, and almost every kind of manufacturing operations which can be found in our oldest states.

The Japanese colonists in California, have purchased another tract of land in Placer County for a tea and mulberry plantation. Herr Schell will return to Japan for the purpose of bringing a large addition to the colonists, and a fresh stock of mulberry plants.

Therecent hot weather in Europe, it is said, has destroyed the oyster beds on the coast of France, and the oyster harvest of the present year will be a total failure.

About 45,000 tuns of ice are annually imported into Great Britain from Norway.

A mixture called "Hallogenin," which is intended to prevent the formation of incrustation in steam boilers, is sold extensively in Germany, and is said to answer the purpose very well. It consists of 65 per cent of sal ammoniac, 17 per cent of chloride of barium, and 18 per cent of catechu.

The Chicago *Railway Review* says the earnings of the Central Pacific Railroad for July were $579,000, an increase of $25,000 over the month of June. Notwithstanding the successive reductions of rates, the result of operations of the first three months since the connection of the eastern lines show a revenue at the rate of $7,000,000 per annum, of which $3,000,000 is net.

The Grand River nurseries, located five miles southeast of Lowell, Michigan, occupy 101½ acres, having 600,000 apple trees, 200,000 peach, 50,000 cherry, 40,000 plum, 30,000 pear, 20,000 quince, and 60,000 miscellaneous trees and shrubs. There is also a vineyard with over 1,000 bearing vines.

The express car of Wells, Fargo, and Company, passing Elko, Nevada, on the 23d of July, had in it two tuns of bullion for New York.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Send for Agents' Circular—Hinkley Knitting Machine Co., 176 Broadway.

Adding Machines, simple & thorough, Macdonald, 37 Park Row.

$1000 a month made by parties in Chicago manufacturing Russell's chilled iron sleigh shoes. Eastern States for sale. W. S. Garrison No. 4, Arcade Court, Chicago, Ill.

Unusual opportunity—Advertisement signed Postoffice Box 993, Minneapolis, Minn.

Manufacturers can now obtain a fine business stand, at very low price, by applying to F. H. Hoyt, Darien Depot, Conn.

Wanted—A partner to patent five good improvements. For further particulars address Postoffice box 124 Brazil, Ind.

To Founderymen.—For Sale—The right to manufacture, in the Eastern States, "Russell's Chilled Iron Sleigh Shoes," with Overman's Pat. fastenings. Universally approved. As good as steel, and cheaper than common iron. Profits immense. W. S. Garrison, No. 4 Arcade Court, Chicago, Ill.

Machinist—J. P. Byrne, of Groveport, Franklin Co., Ohio, writes that he is 16 years of age, and desires to learn the trade of a machinist.

Chicago Railway Review.—Says the Davenport Daily Journal: "Every number fills a place as the organ of railway interests, in which it has, in the West, no rival." Price $2 per year. Advertisements received.

Wanted—Any material more powerful than powder for blasting rock. Address Humbird & Hitchcock, Southampton Mills, Somerset Co., Pa.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

The Best and Cheapest Boiler-flue Cleaner is Morse's. Send to A. H. & M. Morse, Franklin, Mass., for circular. Agents wanted.

Inventors and Manufacturers of small patent articles will consult their interests by addressing R. Tilden, 63 Cornhill, Boston, Mass.

If you have a Patent to sell, or desire any article manufactured or introduced, address National Patent Exchange, Buffalo, N. Y.

E. Kelly, New Brunswick, N. J., manufactures all kinds of machinery used in working Rubber.

The Family Steelyard—A new thing, weighs correctly from a balance and ounce notches throughout. Send for circular. H. Maranville, Akron, Ohio.

Wanted—A competent Sewing Machinist, to take charge of repairing. Address "F," Baltimore, Md.

J. T. Plass' patent safety band saw, is the most perfect saw made. Gives universal satisfaction. Manufactured only at his works, 204 East 29th st., New York. Send for descriptive circular.

Materials for all Mechanics and Manufacturers, mineral substances, drugs, chemicals, acids, ores, etc., for sale by L. & J. W. Feuchtwanger, Chemists, Drug, and Mineral Importers, 55 Cedar st., New York. Postoffice Box 3616. Analyses made at short notice.

Ulster Bar Iron, all sizes, rounds, squares, flats, ovals, and half-ovals, for machinery and manufacturing purposes, in lots to suit purchasers. Egleston Brothers & Co., 166 South st., New York.

Wanted—A second-hand "Index Milling Machine." Send price, etc., etc., to W. F. Parker, Meriden, Conn.

Grindstones are kept true and sharp by using Geo. C. Howard's Patent Hacker. Send for circular 17 S. 18th st., Philadelphia.

Cochrane's low water steam port—The best safeguard against explosions and burning. Manufactured by J. C. Cochrane, Rochester, N.Y.

Send for a circular on the uses of Soluble Glass, or Silicates of Soda and Potash. Manufactured by L. & J. W. Feuchtwanger, Chemists and Drug Importers, 55 Cedar st., New York.

Mill-stone dressing diamond machine, simple, effective, durable. Also, Glazier's diamonds. John Dickinson, 64 Nassau st., New York.

Leschot's Patent Diamond-pointed Steam Drills save, on the average, fifty per cent of the cost of rock drilling. Manufactured only by Severance & Holt, 16 Wall st., New York.

Tempered steel spiral springs made to order. John Chatillon, 91 and 93 Cliff st., New York.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Machinists, boiler makers, tinners, and workers of sheet metals read advertisement of Parker's Power Presses.

Diamond carbon, formed into wedge or other shapes for pointing and edging tools or cutters for drilling and working stone, etc. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

For Sale Cheap—A new combined hand and power cloth-bailing press, all complete. S. J. Dederick, 35 and 37 Park Place, N. Y.

For Sale—A 20-H. P. link-motion propeller engine, suitable for stationary, good order. Hosford & Garsides, 211 Greene st., Jersey City

The "Compound" Wrought-Iron Grate Bar is the best and cheapest. Send for circular. Handel, Moore & Co., 12½ Pine street. Postoffice Box 5,669.

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Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ All reference to back numbers should be by volume and page.

L. M., of N. Y.—Lime in the form of milk of lime will precipitate the carbonate of lime from water which is hard owing to the presence of that salt. The reaction is the combination of the lime with the carbonic acid in the water, which enables the water to hold the carbonate of lime in solution. If the water is allowed to stand long over precipitated carbonate of lime, it will, by the absorption of carbonic acid from the air, regain the power of dissolving the carbonate of lime which will render the water again hard.

R. O., of La.—We much doubt whether the sinking of a water wheel made hollow and water-tight between the arms, into water, so that its weight will be supported by its buoyancy and relieve the journals from friction, will be productive of a saving in power. We should expect the friction of the periphery upon the water which will support the wheel, to be more than that upon the journals in the ordinary way. You need not sacrifice any head to try your experiment. All that is necessary is to sink the wheel pit.

C. E., of Maine.—An illustration of your invention in the SCIENTIFIC AMERICAN could be obtained at less cost than an engraving done in inferior style and printed in circulars, which you would find it difficult to distribute judiciously in large quantities. This hint is a practical one, and worthy to be thought of. After we have printed an illustration we forward it to the patentee.

S. T., of Miss.—The object of rifle grooves is simply to give a rotary motion to the ball on its axis lying in the path of its projection. It is not to retard the ball so that the powder may exert greater force upon it before it leaves the gun. It has been found that the rotary motion thus imparted gives greater directness to the course of the ball, in other words, the ball will "go straighter" to the mark.

F. M. H., of N. Y.—We know nothing of the engine about which you inquire. It will only be fair for you to say that your boiler saves one hundred per cent of fuel over the best boilers now in use, when it has been proved by actual test to do what you say. You will probably wait some time for such evidence, as such a saving is not *theoretically* possible and is practically impossible.

H. C. S., of Ill.—We know of no simple test that can readily be applied to the detection of cotton seed oil in linseed oil. It is difficult to detect it with the best appliances known. The presence of lard oil, and similar adulterations, is best detected practically by the difficulty with which such oils dry. Linseed oil adulterated with lard oil will always be tacky when pure linseed oil has become hard and resinous.

J. H. H., of Va.—The ammonia prescribed as a remedy for toothache is the aqua ammonia of the shops. We advise you, if you are satisfied your neuralgia proceeds from decayed teeth, to have them extracted. In a personal experience which enables us to sympathize fully with you in your affliction, we have found that to be the only sure thing.

H. A. R. of Del.—The use of canned fruits and vegetables is constantly on the increase. We are informed that many manufacturers were unable to meet the demand for their goods last year. So you see that any improvement upon present processes in this industry, has a good chance for success. We are unable, however, to pronounce upon the value of your apparatus without seeing its operation. Your description of it is not clear to us.

V. C., of Pa.—We do not recognize any patentable features in your plan of steam engine. It seems to consist in a modification of the mechanism, and does not contain anything essentially new. The form is a good one no doubt to economize space, but even in this respect it is no better than some others.

E. B. J., of Ill.—You are all wrong in your premises. It is the oxygen that is consumed, *i. e.*, combined with carbon in the experiment you describe. The nitrogen is left. Oxygen does not support combustion by "mere presence." It unites chemically with the substances burned.

J. G., of Vt.—You are certainly an amateur, as you say, or you would know better than to use a file to finish a piece of metal in a lathe, which is required to be perfectly cylindrical. The turning tool should be the last tool to touch it. The best thing for you to do is to visit some machine shop and get some practical man to show you how to get a smooth finish without a file.

R. S., of Pa.—Hoe's rotary press was first used on the Philadelphia *Public Ledger* in 1847. The most important improvements in printing presses have been made within the last thirty years. The Bullock press prints on both sides of the paper the paper being fed in from a roll, and cut off in sheets after printing. The effect of rollers upon type is more injurious than the pressure of a flat surface.

J. C. McD., of Ca.—You are evidently confounding the terms "gather" and "set" as applied to wagon wheels. "Gather" is the inclination of the forward parts of the wheels towards each other, dependent upon the peculiar construction of the axletree. "Set" is the inclination of the bottoms of the wheels toward each other. Think the matter over again.

C. K. H., of La.—The resistances of media upon bodies of equal size moving with equal velocity and of the same weight and form, are as the densities of the media. Water being 800 times as dense as air will offer 800 times the resistance of air.

H. L. B, of N. Y.—We know of nothing better for polishing any kind of metal where a very high luster is required than rotten stone followed by Paris white and rouge. The latter was formerly very extensively used for polishing the silver plates for daguerreotypes.

J. K. J., of N. J.—The best qualities of chrome iron ore contain sometimes as high as sixty per cent of the oxide of chromium. We doubt whether you have found it as you seem to think, although it is possible. So far as we know it is only found in serpentine rocks, either in veins, masses, or pockets.

E. B., of Mass.—The connecting of your stove pipe with two chimneys will not avail to relieve you of the too powerful draft, unless one of the chimneys is much lower than the other. The answers to your other inquiries will be found in an article entitled "Hints on the Burning of Anthracite," which will shortly be published.

R. M. N., of Ga.—Mineral paints are for the most part oxides and sulphides of metals. The ochers about which you particularly inquire, are mixtures of the oxides of aluminum and the hydrated peroxide of iron, with, in some instances, oxide of manganese.

P. McC., of Cal.—There is plenty of room yet for new machines which will manufacture a good quality of wood pulp. To pay well they need only equal in efficiency some already in use. Should your machine prove to be superior to those, success awaits it. Actual experiment can only decide the question.

Petroleum Broker is reminded that in order to get his case before us properly he must put in an open appearance. We are not in the habit of wasting our time upon anonymous correspondents.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

PUMP.—R. W. Crouse, Westminster, Md.—The object of this invention is to provide for public use a double-acting pump, so constructed that it can be conveniently repaired when the packing becomes worn or injured.

MACHINE FOR COVERING LIGHTNING RODS WITH SHEET METAL.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.—This invention relates to a compound lightning rod, composed of an iron body, to give support, and a copper sheathing to furnish a good conducting surface.

CONVERTIBLE HOE AND FORK.—John H. Foster, Charlottesville, Va.—The object of this invention is to provide for public use a simple and durable instrument which can be adjusted to operate either as a hoe or a fork, and which can, at any time, be readily changed from one form to the other, as the work requires.

APPARATUS FOR PRINTING VIGNETTES.—Jean Elie Richard, Columbia, S. C.—This invention has relation to printing large vignettes from the solar camera. In order to print large vignettes, it is necessary that the prepared paper or blank should be placed at a distance from the camera, varying according to the diverging power of the lens and the size of the picture required.

GLASS HOUSE POT.—Thomas Scanlan, Birmingham, Pa.—The object of this invention is to provide for the use of glass manufacturers a pot or crucible in which to prepare the glass, so constructed and operating that it will produce more glass to a "filling" than those heretofore employed, and do its work in less time, and with greater convenience.

COMBINED HAY RAKE AND SEEDER.—A. P. Routt, Liberty Mills, Va.—This invention consists in an improved mode of fastening the teeth of a rake that may be used for raking hay, or for scratching in seed falling from a seed box placed in front of the rake. Also, in an apparatus for rendering the seeder inoperative when the machine is to be used solely as a rake.

EXCAVATOR.—H. H. Beard, Friar's Point, Miss.—This invention relates to a machine for ditching and leveling, in which the soil, cut out by the plows, is received upon an endless apron, and by that conducted to a second transverse endless apron; and the invention consists in making the said transverse apron in sections, and articulating said sections together, and in using plows of peculiar form.

PROCESS FOR PRESERVING VEGETABLES.—Francis H. Smith, Baltimore, Md.—This invention consists in taking Irish potatoes, sweet potatoes, and onions, in the raw state, slicing them, and then subjecting them to the action of steam or hot water, from five to fifteen minutes, as the nature of the vegetable under treatment may require. This operation "sets" or coagulates the albumen and starch contained within the vegetable cells, and prevents discoloration.

WASHING MACHINE.—D. C. Delinger, Decatur, Ohio.—This invention consists in providing a washing machine with two receptacles—one for water alone, and the other for water and clothes; said receptacle being connected by a pipe so that water may be forced from one receptacle to the other and back again, to effect the more thorough cleansing of the clothes; also, in an improved aperture for throwing the water from one receptacle to the other, and, at the same time, washing the clothes.

SIDE-SADDLE TREE.—Jacob Straus, St. Louis, Mo.—This invention consists in combining in one tree a cantle, a back rail, a back spring, and an extension spring, in such a manner as to form a continuous flange along the off and back sides of the tree, so that the latter, when covered with raw hide, forms a saddle in itself, sufficient for all ordinary purposes, and is, at the same time, a perfect tree, upon which a saddle of any sort, and of the most desirable shape, may be built up by an ordinary saddler.

MICROSCOPE.—James H. Logan, Allegheny City, Pa.—In this improved microscope, every part except the lens, screw, clips, and reflecting surface of the mirror, is made of wood. The main features of the invention consist in the general construction and arrangement of the parts, whereby it is possible to make them all of wood, without sacrificing strength and efficiency, together with a new and improved method of effecting the focal adjustment and the peculiar adaptation of the microscope to the convenient and efficient use of globule lenses.

TREADLE FOR MACHINERY.—Carlos Stebbins, Pike, N. Y.—This invention consists of a platform for the foot to rest upon, rigidly attached to the lower part of an oscillating stirrup, said stirrup having an arm projecting at nearly a right angle from the upper end of one of its side arms, the outer extremity of said arm being joined by a connecting rod to a wheel running upon a fixed pivot, from which motion may be communicated to machinery, the whole arrangement being intended to do its work with much less friction and resistance than ordinary treadles.

ATTACHING BELLS TO STRAPS.—Dwight M. Welch, Middle Haddam, Conn.—This invention consists in attaching bells to straps by means of a button or disk, which is soldered to the end of the shank of each bell after the latter has been inserted in a hole previously prepared for it in the strap, whereby a string of bells can be prepared in a few minutes, and at comparatively small expense. Patented Aug. 10, 1869.

STEAM GENERATOR.—J. Quipp and Robert Law, Buffalo, N. Y.—This invention consists in the use of a primary boiler, in which the steam is generated by the fire, and one or more secondary boilers in which the steam for use is generated by the steam from the first boiler; and it has for its object to provide a uniform application of heat to the secondary boilers, which is accomplished by the steam used for heating, which will be of the same temperature throughout the heating space.

COMBINATION LOCK.—Nicholas Reed, Otisville, N. Y.—This invention consists in an arrangement on a sliding locking bolt, engaging in a notch in the side of an ordinary slide bolt for locking it, of a series of combination disks capable of rotation thereon, and adjustment, to permit the said locking bolt to slide, or to prevent it, and also so arranged as to permit the changing places of the disks, and the position of the locking bolt to complicate the combination. It also consists in a guard attachment to hide the letters of the combination when locking, and to hold the disks in the right position while locking or unlocking.

STEM-WINDING WATCH.—James Nardin, Locle, Switzerland.—This invention relates to improvements in stem-winding watches, and watches having stopping devices for the second hands, having for its object to arrange the slides by which the winding devices are changed to gear with the hands, and the stopping is effected for better protection against being moved by the accidental contact of the said slides against anything whether the watch is in the pocket or otherwise. The invention also comprises an improved mode of operating the slide of the winding apparatus to gear the winding stem with the hands for turning them.

SODA WATER FOUNTAIN—Wm. Gee, New York city.—This invention relates to an improved method of connecting bungs, pipes, faucets, plugs, etc., to soda water and other cylinders, when made of thin sheet metal, and either coated or lined with tin or not. The object is to provide a connection for the bungs, etc., which will permit the ready removal thereof when they become worn or require removing from any cause, without disturbing the tin or lead linings of vessels, and without the employment of solder to make the connections tight, the solder being objectionable for the reason that it is difficult to remove for disconnecting the said bungs or other parts, besides being exposed in some of the vessels to the action of acids which destroy it and loosen the parts.

BOILER.—A. J. LeGrand, Boonton, N. J.—This invention relates to improvements in heating boilers, such as are used in houses for supplying hot water or for generating steam for heating buildings, or for heating by hot water, as in horticultural buildings.

BUTTON FASTENING.—John L. Remlinger, Providence, R. I.—This invention has for its object the construction of a simple device for retaining buttons, studs, etc., on shirts and other articles of wearing apparel. The invention consists of two L-shaped plates, of which one projects from the underside of the button, while the other is pivoted to it, so as to swi freely.

SELF-CLOSING TELEGRAPH KEY.—J. H. McElroy (assignor to himself, D. J. H Holly, and H. McElrory), Warwick, N. Y.—This invention relate to improvements in telegraph keys, whereby it is designed to provide an improved self-closing arrangement by the employment of only one spring, so guarded that it cannot be opened by any slight inadvertant touch, or by anything dropping on it; also the combination therewith of a simple and convenient cut out device.

VELOCIPEDE.—S. H. Sawhill, Cambridge, Ohio.—This invention relates to a new two or three-wheeled velocipede, which is to be propelled by hand, and which is so constructed that it can be easily operated, and that the body of the rider will be sustained in the most advantageous position. The invention consists in several improvements of the driving mechanism of the foot supports and steering mechanism, which, separately or combined, tend to produce a simple and convenient apparatus.

SEED PLANTER.—John Stark, Thomasville, Ga.—This invention consists in a new manner of operating the seed slide, from the axle of the rear supporting wheel; also, in arranging a rotating reel within the drop-box for separating cotton seed and for breaking up lumps of fertilizing matter that might enter the box; and in providing adjustable gates for the seed apertures, the position of said gates being regulated by the aid of graduator scales.

BUTTON AND STUD.—Henry Link, Little Falls, N. Y.—This invention relates to a new manner of connecting the shank of a button or stud to the head or body of the same, so that the latter cannot fall off spontaneously, while it may be removed at will without difficulty.

REELING MACHINE.—E. L. Buckup, Stapleton, N. Y.—This invention relates to a new machine for automatically dividing thread into skeins and hanks, while the same is being wound upon a reel, thereby doing away with very tedious manual labor and with much attention, heretofore required in forming skeins and hanks.

GRINDING TOOL.—E. Babcock and T. B. Farrell, Laurens, N. Y.—This invention has for its object to provide an apparatus by means of which it will be possible for one man to hold a tool to be sharpened against the edge of a grindstone and to also turn the stone.

AXLE FOR VEHICLES.—John Grabach, Clyde, Ohio.—This invention relates to a new spindle and oil reservoir for wagon axles, and has for its object to provide a continuous self-acting lubricating device, by which the axle will be kept greased in a uniform manner. The invention consists in forming an oil reservoir with an adjustable slide on the shank of the spindle, and a spiral groove on the body of the spindle.

DEVICE FOR UTILIZING RECOIL OF HEAVY GUNS.—J. B. Eads, St. Louis, Mo.—This invention relates to a new method of storing up the power developed in the recoil of large guns, so that it may be afterward utilized at the will of the operator, to run the gun into battery, or to raise it above a parapet or other defense, to admit firing over the same. The invention consists principally in devices for causing the force of the recoil to compress an elastic substance or material, such as metallic or other springs, air, water, or other fluid, so that such compressed article or substance will, when allowed to expand, run the gun forward or elevate it as aforesaid, to bring it into position for firing.

CURD GRINDER.—C. W. Terpening, Geneseo, Ill.—This invention relates to a new machine for grinding curd and mixing it with salt, by means of grinding disks that operate above a vat. The object of the invention is to obtain means for rapidly treating and manipulating curd, and for properly blending the salt, so that there will be no danger of souring the curd and spoiling the cheese.

PIPE WRENCH.—Wm. H. Downing, Pioneer, Pa.—This invention relates to a new pipe wrench, which is so arranged that it will securely hold gas and other pipe, and allow it to be turned in either direction without releasing the pipe, and so that it can be adjusted to different sized pipe.

MURRAIN REMEDY.—Henry Jacobs, Fayetteville, Tenn.—This invention relates to a new medicine for the cure of murrain in cattle, and consists in a new combination of ingredients, which are compounded so as to produce an effective medicine.

TIRE AND BAND SHRINKER.—G. W. Dalbey, Carrollton, Miss.—This invention relates to a new device for shrinking all kinds of tires and bands, and consists of a novel arrangement and combination of parts, whereby both large as well as small tires and bands of all kinds can be shrunk to suitable sized circles.

FLOOR FOR MALT KILNS.—Wm. Gerhard, Jr., Florence, Mass.—This invention relates to a new manner of constructing malt kiln floors of longitudinal wires, and has or its object to avoid any projections on the drying surface.

SAFETY LAMP.—E. G. Kelley, New York city.—This invention has for its object to construct a non explosive lamp which is to be used with benzine, kerosene, naphtha, or other hydrocarbon liquids, and in which a collection of dangerous gases is impossible. The invention consists in providing the reservoir of the lamp with a vent for the escape of the gases that may be created in the lamp, and in covering such vent with wire gauze, or perforated metal, for the purpose of providing against the danger of igniting the contents of the lamp by igniting the escaping gases. The invention also consists in applying a wire gauze, or perforated sheet metal plate, to the lower end of the wick tube, to prevent the ignition of the contents of the lamp in case the flame on the wick should be blown into the wick tube.

WATER WHEEL.—P. H. Wait, Sandy Hill, N. Y.—This invention relates to a new manner of constructing the buckets of that class of water wheels which operate with a vertical inlet and discharge inward or central inlet, the guide chates being formed similar to the buckets, but in opposite direction. The object of the invention is to prevent the difficulties arising heretofore in wheels of the said class in which the direct acting point of the bucket moves at a velocity considerably less than the reacting point.

FRUIT BOX.—Geo. M. Fenley, Medora, Ind.—This invention relates to a new and useful improvement in the construction of a fruit box for transporting berries, etc., to market, the fruit box being so hinged together that, when empty, it may be folded up perfectly flat, thus enabling a large number to be packed in a small compass for re-shipment.

RAT TRAP.—J. M. Henrie, Vandalia, Iowa.—This invention consists of a box, preferably having two chambers or spaces, one being permanently covered and the other provided with a sliding cover, which is connected by rods to a crank shaft, to which a weighted cord is attached for rotating it. Each revolution of the crank shaft will withdraw and return the cover, and at each return it is locked, and held until the animal, getting on the cover for the bait, by his weight depresses a hinged part and unlocks it, permitting the weight to draw it back suddenly under a plate which scrapes the animal off into the pit below, where he is secured by the return of the cover. The invention also comprises a locking device for holding it closed when run down, an araangement of springs for quickly setting the cover into motion and arresting the motion of the said cover at the close of the return movement; also, a means of enticing the animals from the receiving chamber into another.

HOT AIR FUBNACE.—Joseph E. Chapman, Cannon Falls, Minn.—This invention relates to a furnace for heating air for warming buildings, or for other purposes.

GAS GENERATING LAMP.—Lasslo Chandor, St. Petersburg, Russia.—This invention relates to an improvement in lamps, whereby it is designed to provide a simple, efficient, and safe lamp, which will, self-acting, generate gas from hydrocarbon oils, namely, petroleum, kerosene, naphtha, benzine, and turpentine, singly or in any way mixed, and all combustible fluids whatever, and burn the same without the aid of the glass chimneys now commonly used with lamps for burning these substances.

PISTON PACKING.—L. P. Garner, Ashland, Pa.—This invention consists in forming wedge-shaped recesses at the ends of the packing rings, and the employment of wedges fitting them, to be acted on when the cylinder takes steam, by the steam, to force them into the recesses to spread and thereby tighten the rings. The direct pressure of the steam on the inner faces of the rings is also made use of in conjunction with said wedges when required.

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HAT PRESSING BAG.—Samuel Wing, Munson, Mass.—This invention relates to improvements in india-rubber or other elastic bags such as are used in the manufacture of straw, felt, and other hats, for holding them when in the pressing molds. The invention consists in the application to such bags of metallic forming rings to insure the proper formation at the corners or at all points or angles where two walls or parts meet.

HINGE COUPLING.—S. W. Perkins, Geneseo, Ill.—This invention relates to a new and useful improvement in hinge couplings for the thills, shafts, or poles, of single or double carriages, and for many other purposes.

COMBINATION PENCIL SHARPENER AND PEN HOLDER.—Moses W. Dillingham, Amsterdam, N. Y.—This invention relates to a new and useful improvement in a device for sharpening lead-pencils and holding a pen.

ROCK DRILL POINT.—C. H. Davis, San Francisco, Cal.—This invention consists in removing parts of the edges of flat pointed drills by making notches or recesses from the point upward, so that the drills will cut only a part of the distance of their breadth, the stone along the other part being broken by the effect of the cutting part.

VINE CUTTER.—Charles Crenshaw, Bartlett, Tenn.—This invention has for its object to furnish an improved machine for cutting potato and strawberry vines, which shall be simple and inexpensive in construction, and effective in operation.

CAR WHEEL.—W. R. Thomas, Catasauqua, Pa.—This invention has for its object to furnish an improved car wheel, simple in construction, strong, and durable.

GUARD FOR CIRCULAR SAWS.—Isaac Holliday, South Brooklyn, N. Y.—This invention has for its object to furnish a simple and convenient device, by means of which the upper or exposed part of a circular saw may be covered in such a way as not to interfere with the operation of the saw, while preventing anything from coming in contact with and being injured by, or injuring said saw.

TRUSS FOR CONNECTING BOOMS TO MASTS.—James E. Tibbetts, Trenton, N. J.—This invention has for its object to furnish an improved device for connecting booms to the masts of vessels, which shall be simple in construction and safe in operation, and which will allow the boom to be conveniently removed when desired.

ELECTRIC FIRE AND BURGLAR ALARM.—Eugene Fontaine, Fort Wayne, Ind.—This invention has for its object to improve the construction of electric fire and burglar alarms, so as to make them more convenient in use, and more reliable and effective in operation.

CURRY COMB.—H. Mithoff, Columbus, Ohio.—This invention has for its object to furnish an improved curry comb, simple in construction, easily and cheaply made, which will at the same time be strong and durable.

PEN HOLDER.—C. G. Wilson, Brooklyn, N. Y.—This invention has for its object to furnish an improved pen holder, designed more particularly for those having stiff or crooked fingers or hands, and which shall be so constructed as to allow the pen to be held at any desired angle or inclination.

WATER WHEEL.—S. D. Taylor, Hazleton, Pa.—This invention relates to new and useful improvements in that class of water wheels known as turbines.

LAMP.—P. Prettyman, Paradise Spring Farm, Oregon.—This invention relates to improvements in lamps, whereby it is designed to provide an improved means for holding the glass chimneys thereon; preventing the wick tube from heating and the communication of heat to the oil chamber, and for facilitating the process of combustion.

REGISTERING APPARATUS FOR SPINNING FRAMES.—Henry P. Gregory, Plattsburgh, N. Y.—This invention relates to improvements in registering apparatus for spinning jacks, and other spinning machinery, the object of which is to so arrange them that dishonest operatives may be prevented from working them to make them register more than they would do by the legitimate operation of the machines to which they are attached.

STEAM PUMP.—L. P. Garner, Ashland, Pa.—This invention relates to improvements in that class of steam pumps, whereby two pump pistons are actuated by one engine, the piston rod of the engine forming one of the pump rods, and actuating the other through the medium of a cog wheel gearing into teeth on the piston rod of the engine, and also into corresponding teeth on the other pump rod.

HORSE HAY RAKE.—Thomas J. West, Alfred Center, N. Y.—The object of this invention is to provide a sulky attachment to the common horse hay rake, and suitable operating mechanism whereby the rake may be manipulated by the attendant while sitting on the seat of the sulky in advance of the rake.

HORSESHOE MACHINE.—Charles P. Williamson, Louisville, Ky.—This invention relates to improvements in machinery for forming horseshoe blanks, and has for its object to provide a simple and efficient arrangement of means for the purpose. The invention consists in an improved arrangement of oscillating bending dies, a sliding former, pressing and creasing die, and discharger.

NEW PUBLICATIONS.

COTTON CULTURE, AND THE SOUTH CONSIDERED WITH REFERENCE TO EMIGRATION. By F. W. Loring and C. F. Atkinson. Boston: A. Williams & Co., 100 Washington street.

This pamphlet is the embodiment of a large mass of information obtained by the authors in response to a circular letter addressed to the cotton planters of the South. It contains a large amount of interesting and authentic information, with a free discussion of the labor and immigration questions. Some extracts from this portion of the work will be found in another column.

BENEDICT'S TIME TABLES.

Benedict Brothers, 691 Broadway, whose "time" has been regarded for many years as standard in this city, are now issuing a series of very convenient time-table cards—small in size—which give the exact time of the departure of all the railway and steamboat lines leaving this city. They are carefully revised from official sources, and 200,000 copies of the cards are now freely circulated every month throughout the city and upon the trains and steamboats. The expense of their publication is met by advertisements printed upon the cards. It seems to us that, as an advertising medium, these time-table cards offer superior advantages.

THE RESOURCES OF CALIFORNIA. Comprising Agriculture, Mining, Geography, Climate, Commerce, etc., and the Past and Future Development of the State. By John S. Hittell. Fifth Edition, with an Appendix on Oregon, Nevada, and Washington Territory. San Francisco: A. Roman & Co. New York: 27 Howard street.

PHYSICAL SURVEY OF VIRGINIA, Her Geographical Position, its Commercial Advantages, and National Importance. Preliminary Report by M. F. Maury, LL.D., etc., Professor of Physics Virginia Military Institute, Lexington, Va., Gen. Francis H. Smith, A.M., Superintendent. Second Edition. New York: D. Van Nostrand, 23 Murray street, and 27 Warren street.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

2,133.—ANNEALING METALS.—James M. Bottum, New York city. July 15, 1869.

2,227.—PRESERVING THE AROMATIC PRINCIPLE OF HOPS.—E. D. Brainard, Albany, N. Y. July 22, 1869.

2,235.—TELEGRAPH-WIRE INSULATORS.—W. E. Simonds, Hartford, Conn. July 22, 1869.

2,241.—PURIFYING ALCOHOL AND PARAFFINE.—C. C. Parsons, New York city. July 23, 1869.

2,261.—REAPING AND MOWING MACHINE.—James Thayer, New York city. July 26, 1869.

2,264.—VALVE.—Gerard Sickies and J. H. Thorndike, Boston, Mass. July 26, 1869.

2,311.—STEAM ENGINE.—John Storer, Peekskill, N. Y. July 26, 1869.

2,329.—SPINNING MECHANISM.—R. L. Walker, Southbridge, Mass. August 3, 1869.

APPLICATIONS FOR EXTENSION OF PATENTS.

LOCK.—Sarah A. Holmes, administratrix of the estate of Richard G. Holmes, deceased, and William H. Butler, of New York city, have petitioned for an extension of the above patent. Day of hearing, October 18, 1869.

LATH MACHINE.—Andrew Blaikie, of San Francisco, Cal., and Walter Clark, of Marquette, Mich., have applied or an extension of the above patent. Day of hearing Oct. 18, 1869.

TOBACCO PRESS.—Rhudolphus Kinsley, of Springfield, Mass., has petitioned for the extension of the above patent. Day of hearing, October 25 1869.

LATHE CHUCK.—Eli Horton, of Windsor Locks, Conn., has applied for an extension of the above patent. Day of hearing, October 25 1869.

PLANING MACHINE.—James A. Woodbury, of Boston, Mass., has applied for an extension of the above patent. Day of hearing October 25 1869.

HAND SEED PLANTER.—D. W. Hughes, of Palmyra, Mo., has petitioned for the extension of the above patent. Day of hearing, November 1, 1869.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING AUG. 17, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

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Full information, as to price of drawings, in each case, may be had by addressing
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93,661.—VAPOR BURNER.—J. E. Ambrose, Lombard, Ill.
93,662.—HEAD-REST FOR DENTISTS' AND BARBERS' CHAIRS.—R. W. Archer, Rochester, N. Y.
93,663.—TOOL-HOLDER FOR HOLDING TOOLS WHILE BEING GROUND.—Egbert Babcock and T. B. Farrell, Laurens, N. Y.
93,664.—MODE OF MOUNTING ORNAMENTAL CROSSES.—W. B. Bennett, Providence, R. I.
93,665.—BUCKLE.—Herman Bernheimer and Henry Newman, New York city.
93,666.—MANUFACTURE OF AX BIT.—Charles Blair (assignor to the Collins Company), Collinsville, Conn.
93,667.—FRUIT GATHERER.—John Bowles, Augusta, Ga.
93,668.—BONE BLACK EQUALIZER.—Daniel Brasill and D. A. Mullane, New Orleans, La.
93,669.—PHOTOGRAPHIC PLATE HOLDER.—Joseph Buchtel, Portland, Oregon.
93,670.—REEL FOR WINDING YARN.—E. L. Buckup, Stapleton, N. Y.
93,671.—RAILWAY CAR AXLE.—H. D. Burghardt (assignor to himself and G. S. Willis, Jr.) Pittsfield, Mass.
93,672.—CLOTHES PIN.—M. E. Burlingame, Willett, N. Y.
93,673.—MANGER.—Adam Chambers, Unionville, N. Y.
93,674.—VAPOR BURNER.—Lasslo Chandor, St. Petersburg, Russia, assignor to Cassius M. Clay.
93,675.—HOT AIR FURNACE.—J. E. Chapman, Cannon Falls, Minn.
93,676.—COAL ELEVATOR.—L. S. Chichester, New York city.
93,677.—APPARATUS FOR ELEVATING AND WEIGHING COAL, ETC.—L. S. Chichester, Brooklyn, N. Y. Antedated August 5, 1869.
93,678.—TRUNK AND OTHER HANDLES.—John Churchill, Bristol, Conn.
93,679.—MACHINE FOR ROLLING HOE BLANKS.—W. T. Clement and E. V. Foster, Northampton, Mass. Antedated August 4, 1869.
93,680.—GANG PLOW.—Peter Conrath, Freeburg, Ill.
93,681.—VINE CUTTER.—Charles Crenshaw, Bartlett, Tenn.
93,682.—WAGON BRAKE.—C. J. Crounse, Clarksville, N. Y.
93,683.—MACHINE FOR UPSETTING TIRES.—G. W. Dalbey, Carrollton, Miss.
93,684.—ROCK DRILL POINT.—C. H. Davis, San Francisco, Cal.
93,685.—DOOR LATCH.—F. W. Dean, Tremont, Ill.
93,686.—POWER APPARATUS FOR VEHICLES.—J. G. Dillaha, Waco, Texas, assignor to himself, R. M. Boone, and N. D. Bailey, Chicago, Ill.
93,687.—PENCIL SHARPENER.—M. W. Dillingham, Amsterdam, N. Y.
93,688.—PIPE WRENCH.—W. H. Downing, Pioneer, Pa.
93,689.—ELECTRO-MAGNETIC ENGINE.—A. E. Dupas, New Orleans, La.
93,690.—HAND SEED PLANTER.—Jeptha Dyson, Philadelphia, Pa.
93,691.—GUN CARRIAGE.—J. B. Eads, St Louis, Mo.
93,692.—CULTIVATOR AND HARROW COMBINED.—Ezra Emmert, Franklin Grove, Ill.
93,693.—FRUIT CRATE.—G. M. Fenley, Medora, Ind.
93,694.—RAIN WATER CUT-OFF.—Edward Fleming (assignor for one half to G. A. Pease,) Ann Arbor, Mich.
93,695.—TEETH FOR CULTIVATORS.—H. F. French, Boston, Mass.
93,696.—STEAM PUMP.—L. P. Garner, Ashland, Pa.
93,697.—STEAM ENGINE PISTON PACKING.—L. P. Garner, Ashland, Pa.
93,698.—VAPOR BURNER.—T. S. Gates and A. H. Fritchey, Columbus, Ohio.
93,699.—CONDUCTOR FOR ROLLING MILLS.—John Gearing, Pittsburgh, Pa.
93,700.—SODA FOUNTAIN.—William Gee, New York city.
93,701.—FLOOR FOR MALT KILNS.—William Gerhard, Jr. Florence, Mass.
93,702.—WASHING MACHINE.—Edwin Gillis, Battle Creek, Mich.
93,703.—CARRIAGE SPRING.—J. W. Gilmer, and W. H. De Valin, Sacramento, Cal.
93,704.—MACHINE FOR DOUBLE-SEAMING SHEET METAL.—James Glober, Omaha City, Nebraska.
93,705.—MACHINE FOR TURNING THE EDGES OF SHEET METAL.—James Glober, Omaha City, Nebraska.
93,706.—MACHINE FOR PRESSING DOWN THE SEAMS IN SHEET METAL.—James Glober, Omaha City, Nebraska.
93,707.—CARRIAGE AXLE.—John Grabach, Clyde, Ohio.
93,708.—CLOTHES DRYER.—W. S. Graves, Kansas City, Mo., and A. S. Capron, Grass Lake, Mich.
93,709.—REGISTERING APPARATUS FOR SPINNING MULES.—H. P. Gregory, Plattsburg, N. Y.
93,710.—MACHINE FOR FORMING PLOW HANDLES.—G. V. Griffith, Fort Wayne, Ind.
93,711.—SASH FRAME AND FASTENER.—J. M. Hale, Georgia Plains, Vt. Antedated August 5, 1869.
93,712.—GRATE.—Robert Ham, Troy, N. Y.
93,713.—MANUFACTURE OF IRON AND STEEL.—James Henderson, New York city. Antedated August 4, 1869.
93,714.—RAT TRAP.—J. M. Henrie, Vandalia, Iowa.
93,715.—BENCH SHEARS.—John Hill, Charlotte, Mich., assignor to himself and William Adams.
93,716.—GUARD FOR CIRCULAR SAWS.—Isaac Holliday (assignor to himself and J. S. Dean), South Brooklyn, N. Y.
93,717.—REMEDY FOR MURRAIN IN CATTLE.—Henry Jacobs, Fayetteville, Tenn.
93,718.—CARPET BEATER.—Thomas Jordan, Brooklyn, N. Y.
93,719.—LAMP.—E. G. Kelley, New York city.
93,720.—COMBINING A LETTER BALANCE AND A PEN HOLDER.—R. B. Kepner, Philadelphia, Pa. Antedated August 12, 1869.
93,721.—FANNING MILL.—T. B. Kirkwood, Dublin, Ind.
93,722.—SIDE WALL REGISTER.—J. M. W. Kitchen, Brooklyn, N. Y.
93,723.—FLUE BRUSH.—J. D. Kunkel, Cincinnati, Ohio, assignor to himself, Frederick Stockhone and C. F. Hornberger.
93,724.—HEAD BLOCK FOR SAW MILLS.—C. Leffingwell, Clarksburg, Ohio.
93,725.—BOILER.—A. J. Le Grand, Boonton, N. J.
93,726.—BUTTON.—Henry Link, Little Lalls, N. Y.
93,727.—GRINDING AXES.—Harvey Mann, Bellefonte, Pa.
93,728.—SELF-CLOSING TELEGRAPH KEY.—J. H. McElroy, Warwick, N. Y.
93,729.—MACHINE FOR SOWING PLASTER, GRASS-SEED AND GRAIN.—A. W. McKay, Elkhart, Ind.
93,730.—CULTIVATOR PLOW.—Neal McKay, Columbia, Mo.
93,731.—SEWING MACHINE.—Daniel Mills, New York city, assignor to Charles Goodyear Jr., New Rochelle, N. Y. Antedated Feb. 17, 1869.
93,732.—CURRY-COMB.—H. Mithoff, Columbus, Ohio.
93,733.—SAFETY GUARD FOR GUN NIPPLE.—C. T. Moore Gilmanton, N. H.
93,734.—ICE PITCHER.—Bernard Morahan, Brooklyn, N. Y.
93,735.—STEM WINDING WATCH.—James Nardin, Locle Switzerland, assignor to V. T. Magnin, Guédin, and Co, New York city.
93,736.—SCOOP.—Andrew Nonnamaker, Circleville, Ohio.
93,737.—HORSE POWER.—George Oerllein, Utica, Minn.
93,738.—HORSE POWER.—George Oerllein, Utica, Minn.
93,739.—PROCESS FOR PURIFYING PARAFFINE.—C. Chauncey Parson, New York city.
93,740.—TREADLE.—C. Chauncey Parson, New York city.
93,741.—THILL COUPLING.—S. W. Perkins, Geneseo, Ill.
93,742.—COAL STOVE.—Jacob S. Platt, Philadelphia, Pa.
93,743.—TUCK-CREASING ATTACHMENT FOR SEWING MACHINES.—Wm. Preiss, New York city.
93,744.—LAMP BURNER.—Perry Prettyman, Paradise Spring Farm, Oregon.
93,745.—STEAM GENERATOR.—Jonathan Quipp and Robert Law, Buffalo, N. Y.
93,746.—TINSMITHS' SHEARS.—Ellery P. Ralph and James Hannan, Gallipolis, Ohio.
93,747.—COMBINATION LOCK.—Nicholas Reed, Otisville, N. Y
93,748.—BUTTON.—John L. Remlinger, Providence, R. I Antedated August 12, 1869.
93,749.—CULTIVATOR.—John J. Rose, Elmwood, Ill.
93,750.—HORSE HAY FORK.—John W. Roe, Lewisburg, Pa.
93,751.—VELOCIPEDE.—S. H. Sawhill, Cambridge, Ohio.
93,752.—EXPLOSIVE COMPOUND FOR USE IN FIREARMS, BLASTING, ETC.—Taliaferro P. Shaffner, Louisville, Ky.
93,753.—EXPLOSIVE COMPOUND.—Taliaferro P. Shaffner, Louisville, Ky.
93,754.—EXPLOSIVE COMPOUND.—Taliaferro P. Shaffner, Louisville, Ky.
93,755.—BLASTING FUSE.—Taliaferro P. Shaffner, Louisville, Ky.
93,756.—MANUFACTURE OF NITRO-GLYCERIN.—Taliaferro P. Shaffner, Louisville, Ky.
93,757.—METHOD OF BLASTING WITH GUNPOWDER AND OTHER EXPLOSIVE SUBSTANCES.—Taliaferro P. Shaffner, Louisville, Ky.
93,758.—MAKING CAST STEEL.—Charles William Siemens, Westminster, England.
93,759.—DEVICE FOR SHIFTING BUGGY TOPS.—W. B. Slutter, Warsaw, Ind.
93,760.—TOY TOP.—Thomas E. Sparks, Norwich, Conn.
93,761.—ADJUSTABLE CLUTCH FOR LIFTING WELL TUBING.—Wm. A. Spring, Titusville, Pa.
93,762.—SEEDING MACHINE.—John Stark, Thomasville, Ga.
93,763.—CAMERA STAND.—Isaac H. Stoddard, Amenia, assignor to E. and H. T. Anthony and Company, New York city. Antedated August 12, 1869.
93,764.—FURNACE FOR STEAM GENERATORS.—Friedrick Sulter, St. Paul, Minn.
93,765.—HARVESTER.—Lorens Swenson, North Cape, Wis.
93,766.—FASTENER FOR WHIP SOCKETS.—O. W. Swift, New Haven, Conn.
93,767.—WATER WHEEL.—S. D. Taylor, Hazleton, Pa.
93,768.—CURD GRINDER.—C. W. Terpening, Geneseo, Ill.
93,769.—CAR WHEEL.—W. R. Thomas, Catasauqua, Pa.
93,770.—TRUSS FOR CONNECTING BOOMS TO MASTS.—James E. Tibbetts, Trenton, N. J.
93,771.—COMBINED WATER TANK AND WARMING CLOSET.—Joel Tiffany, Albany, N. Y.
93,772.—OILER FOR THE SLIDES OF STEAM ENGINES.—Christopher C. Tracy (assignor to himself and James E. Grannis), New York city.
93,773.—CHAIR, TABLE, AND STAND COMBINED.—Abigail W Viles, Elkhorn, Wis.
93,774.—WATER WHEEL.—P. H. Wait, Sandy Hill, N. Y.
93,775.—KINDLING WOOD.—J. Wesley Webber, New York city.
93,776.—MANUFACTURE OF FLOOR OIL-CLOTH.—John Weems and Wm. Weems, Johnstone, Great Britain.
93,777.—HORSE RAKE.—Thomas J. West, Alfred Center, N. Y
93,778.—HORSESHOE MACHINE.—Charles P. Williamson, Louisville, Ky.
93,779.—RAILWAY STOP CHAIR.—John A. Wilson, Altoona, Pa.
93,780.—PEN HOLDER.—Charles G. Wilson, Brooklyn, N. Y.
93,781.—STOVE AND FURNACE GRATE.—George A. Wing, Albany, N. Y.
93,782.—BASE-BURNING STOVE.—George A. Wing, Albany, N. Y.
93,783.—HAT-SHAPING MACHINE.—Samuel Wing, Munson, Mass.
93,784.—QUILTING FRAME.—George C. Winters (assignor to himself and Edwin Miller), Winfield, Mich.
93,785.—PEPPER CASTER.—Ferdinand Wolf (assignor to himself and Henry Hanf), South Boston, Mass.
93,786.—CARRIAGE JACK.—Joseph E. Woll, Allegheny City Pa.
93,787.—SAWING MACHINE.—Hollis Woodward, Milwaukee, Wis. Antedated August 5, 1869.
93,788.—COCK-EYE FOR HARNESS.—Lyndon Worster, Syracuse, N. Y.
93,789.—FLEXIBLE WAINSCOT.—John F. Worth, Brooklyn, N. Y.
93,790.—FEED-WATER HEATER.—Peter C. Wortman, Meadville, Pa.
93,791.—CARRIAGE.—Benjamin F. Adams, Bangor, Me.
93,792.—BUCKLE.—Theodore Bailey, Fairfax county, Va., and Howard H. Young, Washington, D. C.
93,793.—CHAIN STOPPER.—William D. Barker, East Abington, Mass.
93,794.—PUMP.—A. Balding, Memphis, Tenn.
93,795.—APPARATUS FOR CARBURETING AIR.—J. F. Barker, Springfield, Mass., and C. N. Gilbert, New York city.
93,796.—EXCAVATOR.—H. H. Beard, deceased, Friar's Point, Miss. (W. J. St. John administrator.)
93,797.—METALLIC REMEDY FOR RHEUMATISM.—Moses Bernheim, New York city.
93,798.—FRICTION CLUTCH.—Erastus B. Bigelow, Boston, Mass.
93,799.—HARNESS-OPERATING MECHANISM FOR LOOMS.—Erastus B. Bigelow, Boston, Mass.
93,800.—POWER LOOM FOR WEAVING PILED FABRICS.—Erastus B. Bigelow, Boston, Mass.
93,801.—STEADY REST FOR LATHES.—James Brodie, San Francisco, Cal.
93,802.—SODA-WATER APPARATUS.—J. R. Brown, New Haven, Conn.

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93,803.—MACHINE FOR CUTTING LEATHER INTO ROUND BANDS.—Christopher G. Burnham (assignor to himself and Lewis H. Rogers), East Hartford, Conn.
93,804.—PAINT.—Eben S. Burns, Portland, Me.
93,805.—HAY TEDDER.—A. H. Caryl, Groton, Mass.
93,806.—HAY RAKER AND LOADER.—Jacob F. Chandler (assignor to himself and Abner F. Durgin), Concord, N. H.
93,807.—COUNTERSINK AND BIT.—William A. Clark, Woodbridge, Conn.
93,808.—HOLLOW AUGER.—William A. Clark, Woodbridge, Conn.
93,809.—PAPER BOX.—H. H. Dorbin, New Britain, Conn.
93,810.—PUMP.—R. W. Crouse, Westminster, Md.
93,811.—MECHANISM FOR OPERATING THE NIPPERS OF COMBING MACHINES.—Horace Daniels, Pawtucket, R. I.
93,812.—WASHING MACHINE.—David C. Delinger, Decatur, Ohio.
93,813.—HORSE POWER.—John B. Fassett, Irasburg, Vt.
93,814.—SHOE.—Frank T. Ferguson, Boston, Mass.
93,815.—SPRING CUSHION.—Chester D. Flynt, Philadelphia, Pa.
93,816.—ELECTRIC FIRE AND BURGLAR ALARM.—Eugene Fontaine, Fort Wayne, Ind.
93,817.—MANUFACTURE OF SUGAR OF LEAD AND ACETIC ACID.—Leonard D. Gale, Washington, D. C., and Isaac M. Gattman, New York city.
93,818.—CHURN.—W. L. Gordon, Dalton, Ga.
93,819.—LIFE-PRESERVING MATTRESS.—J. Durell Greene, Cambridge, Mass.
93,820.—FRUIT JAR.—Charles A. Gregory (assignor to himself and Allen Gregory), Stratford, Conn.
93,821.—BASE-BURNING STOVE.—Luther W. Harwood, Troy, N. Y.
93,822.—BREECH-LOADING FIRE-ARM.—B. B. Hotchkiss, New York city.
93,823.—RUBBER ERASER.—S. D. Hovey, Brooklyn, N. Y.
93,824.—COMPOUND TOOL FOR WATER AND GAS PIPES.—Wm. Humphreys, Waterford, N. Y.
93,825. — CARRIAGE SEAT. — Israel Kinney, Woodstock, Canada.
93,826.—AUTOMATIC BOILER-FEEDING APPARATUS.—Thomas Lovelidge and John Grindrod, Philadelphia, Pa.
93,827.—CHURN.—Addison Moe, Plainfield, N. J.
93,828.—DUMPING WAGON.—C. T. Moore, Gilmanton, N. H.
93,829.—HORSE HAY RAKE.—Daniel B. Neal, Mount Gilead, Ohio.
93,830.—TILE MACHINE.—Solomon Nill, and Daniel Nill, Covington, Ohio.
93,831.—SCISSORS SHARPENER.—Charles E. Palmer, Boston, Mass.
93,832.—BURIAL CASE.—A. S. Patterson, Westfield, N. Y. Antedated Aug. 7, 1869.
93,833.—ICE VELOCIPEDE.—Adam Purvis, Louisville, Ky.
93,834.—MACHINE FOR COVERING LIGHTNING RODS WITH SHEET METAL.—W. S. Reyburn and F. J. Martin, Philadelphia, Pa.
93,835. — APPARATUS FOR PRINTING PHOTOGRAPHIC VIGNETTES.—Jean Elie Richard, Columbia, S. C.
93,836.—MACHINE FOR POUNCING HATS.—John C. Richardson, Newark, N. J., assignor to himself and J. H. Prentice, Brooklyn, N.Y. Antedated Aug. 5, 1869.
93,837.—WOOD PAVEMENT.—W. O. Robbins (assignor to himself and C. W. Stafford), New York city.
93,838.—COMBINED SEEDER AND HAY RAKE.—A. P. Routt, Liberty Mills, Va.
93,839.—GLASS HOUSE POT.—Thomas Scanlan, Birmingham, Pa.
93,840.—COOLING AND VENTILATING APPARATUS.—John J. Schillinger, New York city.
93,841.—PROCESS OF PRESERVING VEGETABLES. — Francis H. Smith, Baltimore, Md., assignor to Francis H. Smith, Jr., New York city.
93,842.—TREADLE.—Carlos Stebbins, Pike, N. Y.
93,843.—SIDE-SADDLE TREE.—Jacob Straus, St. Louis, Mo.
93,844.—CARVING DISH.—C. W. Sykes, Suffield, Conn. Antedated Aug. 13, 1869.
93,845.—SHUTTLE FOR SEWING MACHINES.—James C. Wade, Boston, Mass.
93,846.—BOOT AND SHOE.—G. W. Walker, Lowell, Mass.
93,847.—MACHINE FOR PLANING METAL.—Alonzo Whitcomb, Worcester, Mass.
93,848.—SCREW PROPELLER.—Frederick Wittram, San Francisco, Ca..
93,849.—COMPUTING APPARATUS.—Elizur Wright, Medford, Mass.
93,850.—RAILWAY CAR COUPLING.—Robert K. Andrews, South Valley, N. Y.
93,851.—DEVICE FOR RELIEVING STEAM GENERATORS OF FOREIGN SUBSTANCES.—Francis Armstrong, Pittsburgh, Pa.
93,852.—APPARATUS FOR AERATING AND COOLING DISTILLED WATER.—G. W. Baird, Engineer Corps, U. S. Navy.
93,853.—PLOW.—Ephraim Ball, Jr., Canton, Ohio.
93,854.—HOT-WATER BOILER FOR STOVE.—J. S. Brooks, Rochester, N. Y.
93,855.—MACHINE FOR MAKING BARRELS.—Wm. Brown, St. Louis, Mo.
93,856.—SAFETY ATTACHMENT FOR POCKETS.—A. W. Browne, Brooklyn, E. D., N. Y., assignor to himself and Andrew Breasted, New York city.
93,857.—APPARATUS FOR THE MANUFACTURE OF PIG BLOOMS FROM CAST IRON.—J. A. Burden, Troy, N. Y.
93,858.—RAILWAY CAR AXLE BOX.—William Campbell, Clinton, Iowa.
93,859.—MANUFACTURE OF READY-PREPARED ROOFING.—J M. Cobb, Beloit, Wis.
93,860.—FENCE.—J. M. Crull, Noblesville, Ind.
93,861.—CIDER AND WINE MILL.—T. F. Deniston, G. C. Prosser, and J. J. Deniston, Torrey, N. Y.
93,862.—KITCHEN UTENSIL.—Jacob J. Diehl, York, Pa.
93,863.—CASTING STEEL INGOTS.—Henry Disston and Jonathan Marsden, Philadelphia, Pa., assignors to Henry Disston.
93,864.—MEAT SAFE FOR BUTCHERS AND OTHERS.—J. J. Doepken, Lima, Ohio.
93,865.—MODE OF TREATING BONEBLACK FOR FILTERING SIRUPS, ETC.—J. O. Donner, Jersey City, N. J.
93,866.—BOTTLE LOCK.—James Dugan, New York city. Antedated Aug. 12, 1869.
93,867.—MACHINE FOR DRESSING MILLSTONES.—John East, Romeo, Mich.
93,868.—MARINE RAILWAY.—Primus Emerson, Carondelet, Mo.
93,869. — CULTIVATOR HOE. — John H. Foster, Charlottesville, Va.
93,870.—MANUFACTURE OF OYSTER KEGS.—Geo. Frauenberger, Rochester, N. Y.
93,871.—LAMP.—Joseph Funk, Tompkinsville, N. Y.
93,872.—DUMPING CAR.—C. Gates, Burlington, Ind., assignor to Geo. Burkhardt, Joseph Shiffer, and J. W. Green.
93,873.—SAWING MACHINE.—Adolphe Gaudron, Detroit, Mich.
93,874.—BOILER TUBE SCRAPING DEVICE.—Edward Green, Wakefield, England. Patented in England Aug. 25, 1866.
93,875.—RAILWAY CHAIR AND SLEEPER. — John Gregory, Lisbon, Portugal. Patented in England October 28, 1868.
93,876.—ARTIFICIAL LEG.—S. G. Gregory, Albany, N. Y.
93,877.—FIRE LADDER.—D. F. Haasz, Philadelphia, Pa.
93,878.—WINDLASS.—W. H. Harfield, London, England. Patented in England Feb. 18, 1867.
93,879.—CHURN.—Samuel Harper, Lawrence, Kan.
93,880.—WASHING MACHINE.—O. L. Hart, Millville, Wis.
93,881.—SEWING MACHINE.—H. C. Heckendorn, Reading, Pa.
93,882.—REFLECTING LAMP CHIMNEY.—Horace L. Hervey, Philadelphia, Pa.
93,883.—WEATHER STRIP.—Coleman Hicks, Lancaster, Ky.
93,884.—STEAM WATER GAGE INDICATOR FOR BOILERS.—W. Hodgson, Cincinnati, Ohio.
93,885.—FRUIT DRYER.—Israel Hogeland, Indianapolis, Ind.
93,886.—WASH BOILER.—J. W. Hoit, Lebanon, Ill.
93,887.—FORK FOR PEACH PEARERS.—C. D. House, Lake Village, N. H.
93,888.—ATTACHING PLOW COULTERS.—D. W. Hughes, Palmyra, Mo.
93,889.—STEAM CYLINDER PISTON PACKING.—Wm. Johnson, Lambertville, N. J.
93,890.—BRICK DRAIN TILE.—Norris Jones, Centerville, Ind.
93,891.—BURNING KILN.—Balthasar Kreischer, New York city.
93,892.—MACHINE FOR TURNING WATCH CASES.—Jacques Laurent, New York city.
93,893.—MACHINE FOR MOLDING CHAIR BACKS.—John Lemman, Cincinnati, Ohio.
93,894.—MACHINE FOR CUTTING AND REDUCING LOAF SUGAR.—A. E. Letorey, Rouen, France.
93,895.—SINGLE MICROSCOPE.—J. H. Logan, Allegheny, Pa.
93,896.—KNIFE FOR SEEDING STONE FRUIT.—S. S. Marques, Mason, Ill.
93,897.—HAY RACK.—David Matteson, Pittsfield, Mich.
93,898.—STONE-SAWING MACHINE.—Richard Morgan (assignor to himself and Henry Tirrel), St. Louis, Mo.
93,899.—PROCESS OF TREATING ORES WITH COPPER AMALGAM BY MEANS OF ELECTRIC CURRENTS.—A. L. Nolf and F. L. A. Pioche, San Francisco, Cal.
93,900.—MATERIAL FOR DYEING AND PRINTING, OBTAINED FROM MADDER.—Alfred Paraf, New York city.
93,901.—FEATHER RENOVATOR.—J. W. Perry, Perrysburg, N. Y.
93,902.—PROPELLING APPARATUS.—F. R. Pike, New York city.
93,903.—MACHINE FOR PLANING METAL.—F. A. Pratt, Hartford, Conn.
93,904.—REFRIGERATOR.—T. L. Rankin, Peru, Ill.
93,905.—CLOTHES-PIN HOLDER.—V. Reifsnider, Chicago, Ill.
93,906.—TOOL HOLDER.—Ezra Ripley, Troy, N. Y., assignor to himself and G. S. Prindle, Aurora, Ill.
93,907.—SCHOOL DESK.—A. E. Roberts, Des Moines, Iowa.
93,908.—ARROW GUN.—Charles Robinson, Boston, Mass.
93,909.—RAILWAY RAIL SPLICE.—John C. Rupp, Newark, Del.
93,910.—PROCESS OF TREATING LEATHER SO AS TO RENDER IT SUITABLE FOR THE MANUFACTURE OF GLOVES, ETC.—N. C. Russell, Gloversville, N. Y.
93,911.—APPARATUS FOR REMOVING AXLE BOXES FROM CARRIAGE HUBS.—Charles Searle, Brooklyn, N. Y.
93,912.—WASHING MACHINE.—D. P. Shaw and J. S. Clark, Elkhart, Ind.
93,913.—GRINDING MILL.—Henry Shaw, Cincinnati, Ohio.
93,914.—HAY AND COTTON PRESS.—W. E. Sheffield, St. Joseph, Mo.
93,915.—VELOCIPEDE.—L. T. Simon, New York city.
93,916.—ROCKING CHAIR FAN.—L. T. Simon, New York city.
93,917.—CHORD FOR BRIDGES.—C. Shaler Smith (assignor to Smith, Latrobe & Co.), Baltimore, Md.
93,918.—OIL TANK.—H. F. Snyder and G. S. Snyder, Williamsport, and Antes Snyder, Blairsville, Pa.
93,919.—SCHOOL DESK AND SEAT.—W. H. Soper, Baltimore, Md.
93,920.—SHIP BUILDING.—J. B. Stoddard, Baltimore, Md.
93,921.—SEWING MACHINE.—N. B. Stoops, Philadelphia, Pa., and J. J. Sibley, New York city.
93,922.—BOILER FURNACE.—J. A. Straight, Albion, N. Y.
93,923.—"SALT STONE" FOR SALTING CATTLE AND OTHER ANIMALS.—V. A. Tagant, Mulhouse, France, and Peter Schuler, Bienne, Switzerland.
93,924.—COMPOSITION LETTER FOR SIGNS, ETC.—A. M. Todd and J. P. Todd, Des Moines, Iowa.
93,925.—GRATE.—Thomas Tomkinson, Philadelphia, Pa.
93,926.—GRAIN SEPARATOR.—J. P. Tostevin (assignor to himself and J. H. Tenspolde), Racine, Wis.
93,927.—EXTENSION CHANDELIER.—Hiram Tucker, Newton, Mass.
93,928.—TURNOUT FOR STREET RAILWAYS.—William Tuttle, Boston, Mass.
93,929.—COOKING STOVE.—Nicholas S. Vedder, Troy, N. Y. Antedated July 13, 1869.
93,930.—SHUTTER FASTENING.—Amos Westcott, Syracuse, N. Y.
93,931.—COPY HOLDER.—Amos Westcott, Syracuse, N. Y.
93,932.—MECHANISM FOR OPERATING SWITCHES.—William Wharton, Jr., Philadelphia, Pa.
93,933.—RAILROAD SWITCH.—W. Wharton, Jr., Philadelphia, Pa.
93,934.—SHUTTER WORKER.—J. W. Wheeler, North Urbana, N Y.
93,935.—METALLIC BASE FOR GLASS AND OTHER VESSELS.—G. C. White, Jr., Brooklyn, N. Y.
93,936.—DAIRY APPARATUS.—James A. Whitney, New York city.
93,937.—CENTERING AWL.—D. A. Wilcox, Woodstock, Vt. Antedated Feb. 17, 1869.
93,938.—COOKING STOVE.—W. F. Williams, East Birmingham, Pa.
93,939.—FIRE-PLACE GRATE.—Walter S. Withers, Atlanta, Ga.
93,940.—STEAM ENGINE.—G. W. Wright (assignor to Francis Wright), Washington, D. C.
93,941.—COMPOSITION FOR PLASTERING WALLS.—D. Young, Kokomo, Ind.
93,942.—WASHING MACHINE. — Friedrich Brinck, Chester, Ill.
93,943.—LOCK NUT.—Frederick Oakley, Toronto, Canada.

REISSUES.

47,782.—HOISTING APPARATUS.—Dated May 23, 1865; reissue 3,596.—George Ambrose, for himself, and Edward Hagan, assignee of G. Ambrose, New York city.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,597.—Division A.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assignees of D. R. Averill.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,598.—Division B.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assignees of D. R Averill.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,599.—Division C.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Company, New York city, assigees of D. R. Averill.
66,773.—PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,600.—Division D.—D. R. Averill, New Centreville, N. Y., for himself, and the Averil Chemical Paint Company, New York city, assignees of D. R. Averill.
66,773.—MANUFACTURE OF PAINT.—Dated July 16, 1867; reissue 3,051, dated July 28, 1868; reissue 3,601.—Division E.—D. R. Averill, New Centreville, N. Y., for himself, and the Averill Chemical Paint Co., New York city, assignees of D. R. Averill.
46,299.—SHOE.—Dated Feb. 7, 1865; reissue 3,602.—Case A.—Charles Buffum, Lynn, Mass., assignee of J. B. Johnson.
68,932.—SLIDE VALVE.—Dated Sept. 17, 1867; patented in England, Feb. 15, 1866; reissue 3,603.—Orlo Cady, Morristown, Vt., and Wm. W. W. Wood, Brooklyn, N. Y., assignees, by mesne assignments, of Thomas Adams and G. J. Parson.
90,733.—COMPOSITION PAPER POLISHER.—Dated June 1, 1869; reissue 3,604.—H. T. Cushman, North Bennington, Vt.
87,097.—CLAMP FOR ELEVATING WELL TUBES.—Dated Feb. 23, 1869; reissue 3,605.—Daniel Fisher, Oil City, Pa.
82,266.—CLOCK.—Dated Sept. 15, 1868; reissue 3,606.—J. B. Mayer, Niagara Falls, N. Y.
79,404.—VAPOR BURNER.—Dated June 30, 1868; reissue, 3,607.—J. D. Smith, Greig, N. Y., assignee of W. H. Smith.
79,275.—BASE-BURNING FIRE-PLACE STOVE.—Dated June 23, 1868; reissue 3,608.—Division A.—David Stuart and Richard Peterson Philadelphia, Pa., assignees of David Stuart and Lewis Bridge.
71,560.—PLOW.—Dated Nov. 26, 1867; reissue 3,609.—George Watt, Richmond, Va.
21,932.—MACHINE FOR COMBING COTTON.—Dated October 26, 1858; reissue 3,610.—M. D. Whipple, Cambridge, Mass., assignee, by mesne assignments, of himself.
87,294.—STEAM GENERATOR.—Dated Feb. 23, 1869; antedated Feb. 12, 1869; reissue 3,611.—J. P. Wood and Joseph Wood, Philadelphia, Pa., and W. E. Wood and C. J. Wood, Baltimore, Md., assignees of G. A. Reidel.
85,115.—TUB FOR DISTILLING ESSENTIAL OILS.—Dated Jan. 19, 1869; reissue 3,612.—B. P. Van Marter, Lyons, N. Y.

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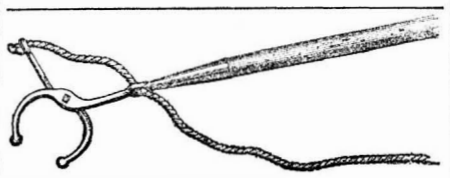

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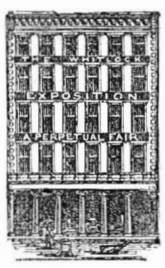

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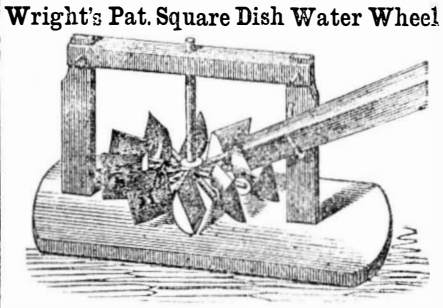

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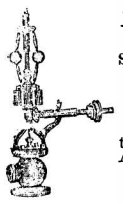

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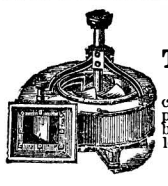

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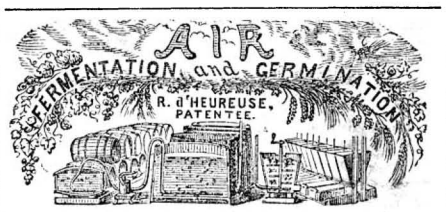

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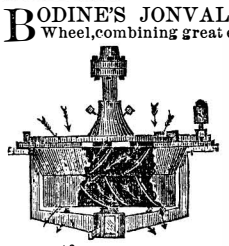

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